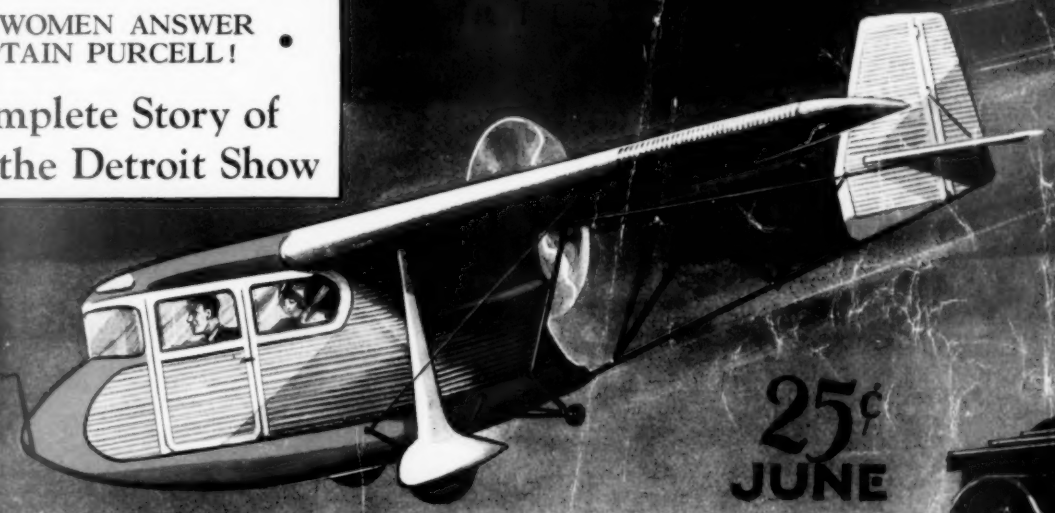
VOLUME VIII, NO. 6

POPULAR AVIATION

The Hazard of Aerial Collisions (page 13)

• THE WOMEN ANSWER CAPTAIN PURCELL! •

The Complete Story of the Detroit Show (page 32)



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JUNE

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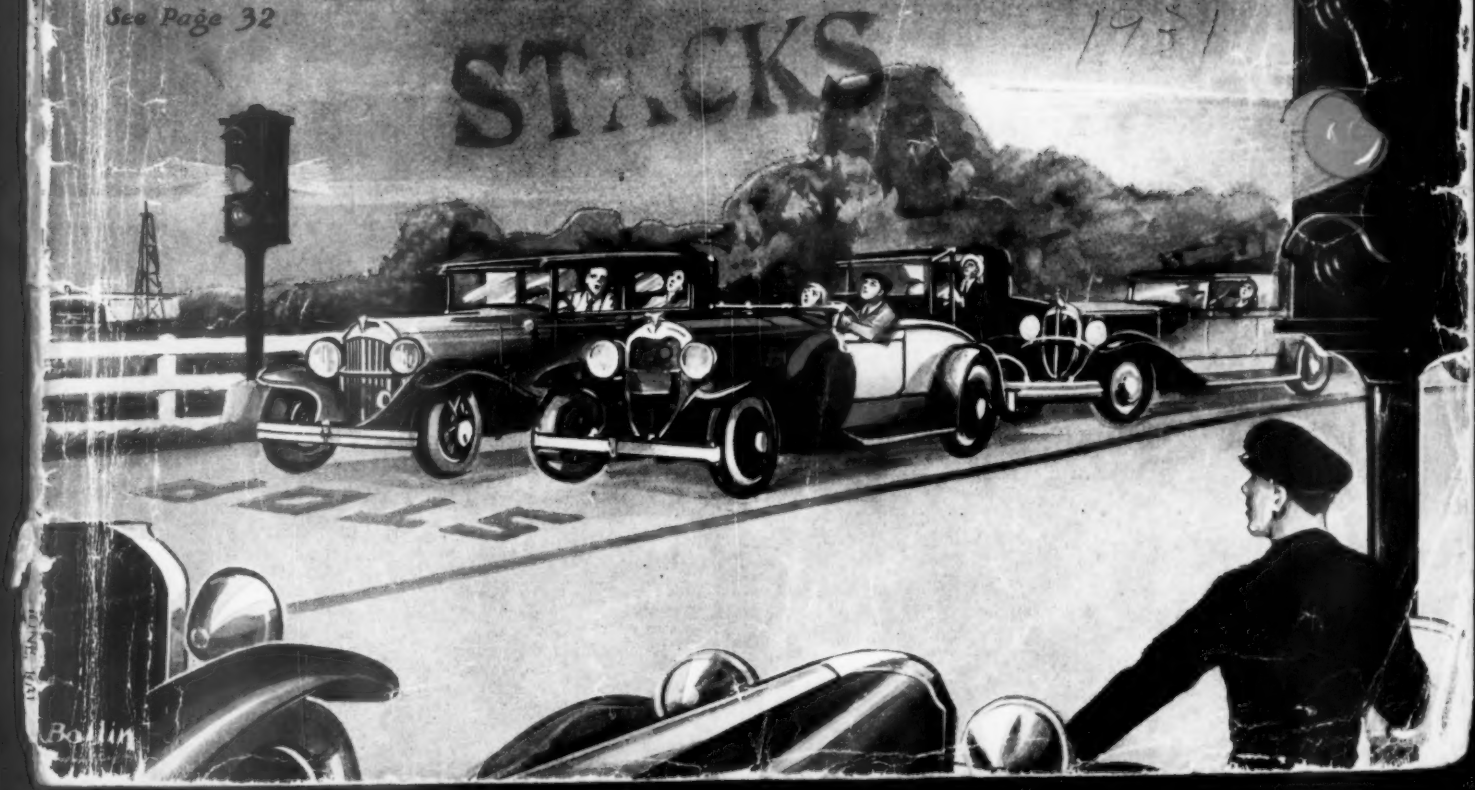

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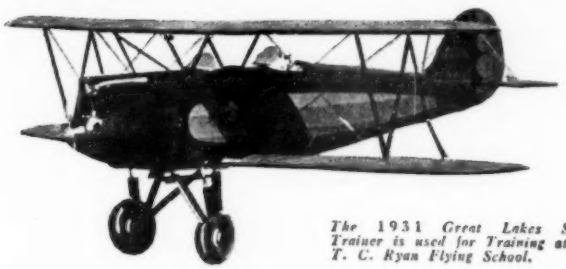

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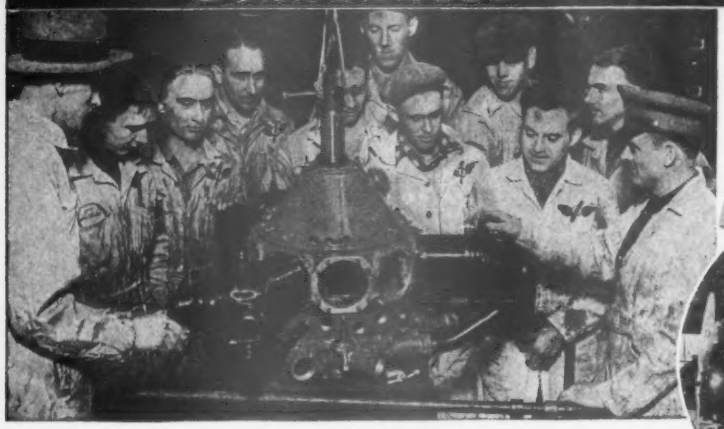

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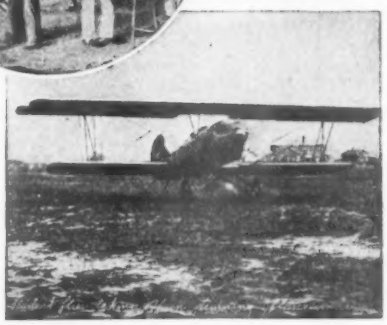

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An Airy Chat *With the* Editor

JUNE! Almost too good outdoors to bother about sitting down and reading, but if you'll just pull up a chair and lend us your ear, we'll take you through the month's collection of facts and fancies.

* * *

LIEUTENANT RICHARDSON has again furnished us with the feature war story. This month it is a little different from the type of story we have run in the past, but we think you will like it all the more, because of that.

We have just discovered that Lieutenant Richardson is preparing a book about American war fliers and has spent more than a year in gathering facts from former war pilots.

We hope that this means that he will have a lot more stories for us, because his yarns seem to be very popular. The following letter, from Mr. E. R. Wood of Richland, N. J., is typical of many received:

"Lieutenant James M. Richardson's article in your April number has lifted your magazine to a new plane of excellence and interest. If you are going to publish his stories, I wish to become an immediate subscriber.

"I see that Lieutenant Richardson holds the Distinguished Service Cross. Why not ask him to tell his *own* experiences?"

We had already asked for the story of Richardson's own experiences before this letter arrived and we hope to have it for publication very soon.

* * *

W. L. OLIVER crashed through with a crash story this month. Mr. Oliver is a real old-timer at this aviation business and has seen a lot of good pilots come and go. In his business of aerial transport, he has made a special study of the elements that contribute to accidents in order that he may avoid these situations as much as possible.

For those who like thrills, there are plenty in Mr. Oliver's story this month. And for those who are interested in the future safety of aircraft, there are valuable lessons to be learned from the facts presented.

* * *

AND still we're being deluged with letters about the war planes. It seems that this is about the most popular feature we have published in a long time. We are glad this month to give you a few more additions to the list, including a genuine, dyed-in-the-wool Gotha bomber. (We're still being kidded about that April fool boner.)

Almost daily we are finding additional sources of material on war planes and we'll let you have some more as soon as we can get up another batch.

* * *

POOR old Rathbun! And poor old Purcell!

These two boys have taken an awful beating lately at the hands of you readers.

It seems that Rathbun will never live down his statement that aviation progress is the bunk, and as for Purcell, his name is "Mud" among the ladies.

In order to give these two bozos a chance to get back on their feet, we're going to call these two subjects closed.

Gosh! You've got to stop an argument sometime, don't you?

* * *

THE Model Boat Contest in the April issue was a huge success. The tremendous number of letters almost swamped Mr. Ott and the task of reading and judging the entries is so great that we will have to postpone announcement of the winners for another month.

So, you ten lucky winners, just hold your horses. You'll get your prizes yet.

* * *

AS we look through this issue and think of all the things we could tell you about each article, we just have to give up in despair—we wouldn't have room for anything else in this chat.

So we'll just tell you to read the whole issue from cover to cover—everything in it—and then if you don't think this is the best issue we've ever put out, you're invited to write and tell us why not.

* * *

THERE have been a number of contributions to the Heath Memorial Fund.

For those who did not see the announcement in last month's Airy chat, we will repeat the general outline of the fund.

C. C. Arms of North Canton, Ohio, suggested that the readers of POPULAR AVIATION would be glad of the opportunity to express their appreciation of the work of the late Ed Heath, pioneer in the lightplane field.

POPULAR AVIATION has agreed to act as trustee of a fund to purchase a suitable memorial from the readers of POPULAR AVIATION.

Contributions should be addressed to: Heath Memorial Fund, care POPULAR AVIATION, 608 South Dearborn St., Chicago.

* * *

SOME of you American readers who think you have a monopoly on POPULAR AVIATION, just read this letter from L. Mathews, 73 Coniston Rd., Addiscombe, Surrey, England:

"I have read five issues of POPULAR AVIATION and I intend to get it regularly. The true war yarns are fine, and Famous Planes of the World War was just what I wanted. I hope you give some more like it. I like the photos and articles on service aviation best.

"There is an R. A. F. 'drome about three miles from here. It is Kenley Aerodrome. Two squadrons are stationed there, the 23rd Fighter Squadron, flying Gloster Gamecocks, Bristol Jupiter engine, 450 h.p., and the 32nd, with Bristol Bulldogs.

"One flight of the 23rd is to be re-equipped with the Hawker Hart 2-place fighter as an experiment, to see if they are any good for modern requirements.

"Up to the last month or two, the 32nd had Armstrong Whitworth Siskins with Jaguar motors. Now they have the Bulldog.

"The squadron mark of the 23rd is red and blue squares, alternately on fuselage and on top wing. The 32nd has a blue band slashed in two places, diagonally.

"By the way, if any reader of P. A. would like some R. A. F. and civil plane photos and the squadron marks of all the Fighter outfits in the

(*Continued on page* 64)

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Volume 8 | JUNE, 1931 | Number 6

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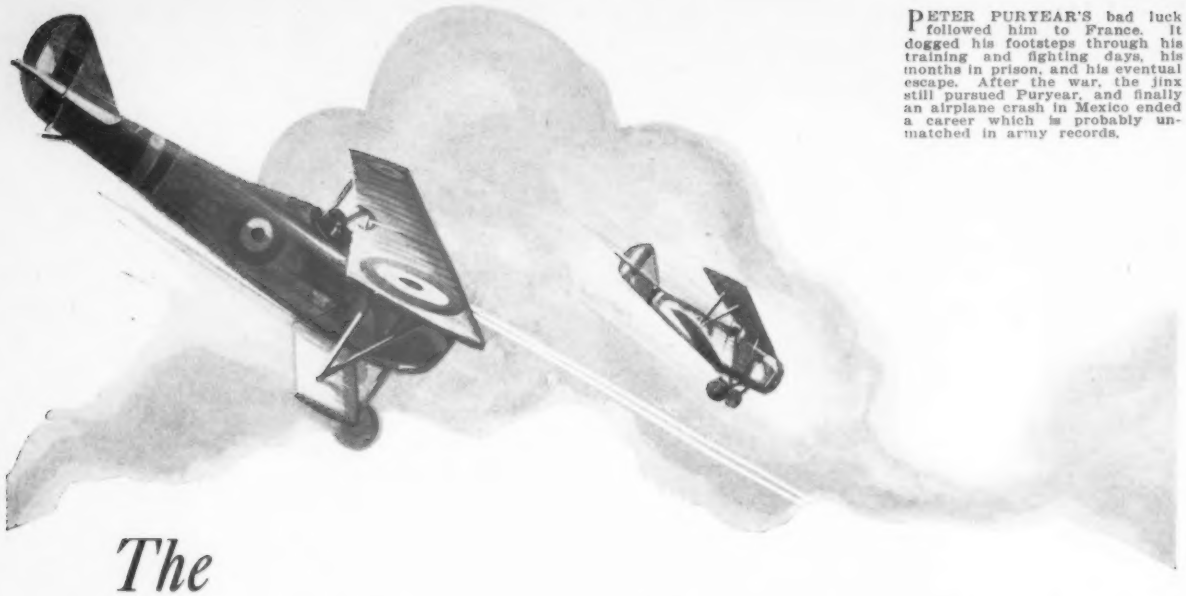


PETER PURYEAR'S bad luck followed him to France. It dogged his footsteps through his training and fighting days, his months in prison, and his eventual escape. After the war, the jinx still pursued Puryear, and finally an airplane crash in Mexico ended a career which is probably unmatched in army records.

The Fighting Career of "Lucky" Peter

An unparalleled record of the boners, tough breaks and hectic adventures which befell Peter Puryear, the first American flyer to escape from a German prison.

by LIEUT. JAMES M. RICHARDSON, D.S.C.

MY memory of Peter Puryear goes back to the early autumn of 1915. Five of us were watching a football game. Without a warning of any kind the grandstand seat on which we were sitting gave way, and Peter, who was in the middle, hit the ground first, the rest of us using him involuntarily for a cushion. Everybody escaped injury except Peter, who suffered painful bruises.

A few weeks later Peter, a friend of his and myself were motoring thirty miles to his home town. The road was narrow and treacherous, and when night came a light rain fell on the slick clay, thus increasing our difficulties.

Acetylene headlights, widely used at that period, were vagarious, and ours went out while we were traveling at high speed. There was a tense moment in stygean darkness, the brakes groaned terrifyingly, our car shot down the steep embankment at the roadside.

Even in the ditch bed it stayed upright for what seemed an age, then it rolled suddenly and landed with four wheels up. We pulled Peter, bruised and covered with oil, from the wreckage. His friend and I were not even scratched.

The following year Peter suffered three or four more minor disasters, and the most dull witted began to consider him no darling of fortune.

In 1917, with his country on the verge of war, Peter acted quickly. The appeal of adventure offered by the Army Air Service fascinated him and drew him into its fold. Then over a period of five months, during which I also joined the Air Service, there was little news of Peter.

Then a report came to me one day of a freak accident: a cadet had taxied his machine into a line of idle machines in front of the hangars, the wing of the cadet's plane had clipped the whirling propeller of one of the idle machines and splintered it. A splinter had hurtled through the air with such violent force that it lacerated the cadet's arm badly.

It was the improbable accident, the accident having no greater frequency than once out of a thousand times, given the same set of governing conditions. The injured aviator was Peter.

When next I saw him, he was in France. He completed his training successfully and spent the next two months as a ferry pilot, that is, flying new machines from the acceptance point at Orly to bases of supply and to training areas.

Fate dealt him steady hands during this period—a breathing spell and a preparation for the great rude iron game of chance: war, a game in which life was but an ephemeral bubble.

Finally, in July, he joined the 95th Squadron at Saints, in the rear of

"Peter's companions closed in on the enemy from behind and above. He dived in from below—"

Chateau-Thierry. A few practice flights, a few instructions from experienced pilots, and he became a cog in a flight of fighting machines. And from this point you follow one of the unique careers of the war.

IN ONE of Peter's early flights he found that he had lost his formation among the clouds. Disturbed by this incident, he darted through a cloud fringe and saw a single machine underneath him.

Here was the chance he had long waited for—a single-seater far below. The conditions for attack were ideal. Yes, it surely looked like a Fokker. There could be no mistaking that distinctive silhouette. He couldn't see the black crosses, of course; the machine was too far away.

In a split second this passed through his mind. He made his decision to attack. He plunged madly downwards in a screaming Spad, the force of the resisting air pushing him against the fuselage behind his head. Nearer and nearer to his intended prey he sped; unobserved, he felt sure.

Now was the time!

His nerves grew taut. He pulled his plane from the dive. He tore in behind the other plane with incredible speed—one hundred yards—seventy-five—fifty yards.

Through his ring sight his foe loomed as large as a Zeppelin now. He touched his triggers. There was a sharp staccato crack. The tracer bullets all seemed to bury themselves in the fuselage of the machine ahead.

At this juncture the pilot of the attacked machine, obviously injured, dived in a virage or circle. Peter, with the tumult of battle suffusing him, dived headlong after him and continued to pepper the plane whenever he could maneuver into position.

Following to within fifty feet of the ground, Peter saw his prey land. And a moment later he saw a detachment of French soldiers run out to make the pilot prisoner.

Climbing again, Peter headed for home, joyful in the thought of his first victory about which there could be no question of adequate confirmation. (No credit for an aerial victory was granted unless at least two witnesses saw one's opponent fall.)

At his home airdrome Peter landed and rushed into the operations' room to report his victory.

"It landed here near Dormans," Peter said, indicating the spot on the map.

"And what type machine was it, Lieutenant?" asked the operations' officer.

"A Fokker, I believe," Peter replied.

Within an hour the squadron received word that Peter's prey was an Englishman, not a German, and that Peter had forced him to land with a bullet in his arm.

To explain this contretemps to the English flier's squadron commander required a great deal of finesse on the part of American fliers. It was finally patched up over the jugs, and everything was merry again.

But I forget Peter, whom the awkward incident dejected completely. Even the fine sportsmanship of the English pilots failed to pull him back to normal for several days.

WHEN Peter made his next trip across the lines, several days later, some of the fiercest fighting of the war was in progress just under him.

The front line frequently fluctuated back and forth over a two-mile depth during a given day. Each attack was followed by a violent counter attack.

Peter was one of a flight of three who reached the lines that morning, scheduled for an early patrol between Oulchy and Chateau-Thierry.

Dressing hastily, he had not stopped for breakfast, deciding to have it later.

Peter gave little thought to the surging battle below him as he flew along in formation. He was absorbed in looking for enemy planes and finally spotted what he believed to be one some distance below.

At the same time his flight leader saw the machine and signalled for an attack. Completely circumspect this time Peter determined to make sure of his game before bagging it.

A short dive behind the other two planes of his formation and he was satisfied: there were the tell-tale black crosses on the wings, and this was a two-seater they had to attack.

Peter's companions closed in on the enemy from behind and above. He dived in behind and below—the proper method of attack on a two-seater.

As Peter opened fire, the observer in the two-seater saw the Americans and retaliated but soon discontinued either because of a gun jam, because of injury to himself or because the Spads' fire had put his gun out of commission.

Not being hampered by enemy fire, Peter pressed his adversaries and soon saw the German gunner fall into the cockpit. Now was his chance. He closed in to fifty feet, sprayed the German machine with bullets and compelled the pilot to go down in a fast dive. Until his foe reached the ground, Peter hung on and continued to shoot.

It was the hope and dream of every airman to make one of his foe land so that plane, gun and pilot might be taken intact. Peter could see this dream realized, and he decided to give it the personal touch by landing alongside to get a first-hand confirmation.

He *had* shot down an Englishman, but this complete victory would somehow atone for that bitter sting.

Peter circled the field once and saw one occupant of the German machine pull the other out and carry him away over his shoulder. He headed his Spad into the rough field where the German had made a perfect landing.

Peter's landing was good, also, but in trying to taxi around to the other machine he ran into a shell hole and put the Spad out of commission.

Releasing himself from his delicate, upside down position, he crawled out to have a look at his captives. He didn't see his captives nor anyone else, but a whining, spitting chorus of machine gun fire startled him. They couldn't be shooting at him, could they?

As he tried to figure out where he was by the captive balloon in the distance and his immediate surroundings, a soldier approached him and in a few minutes a whole bunch ran out and made him prisoner.

Instead of landing behind our own lines, as he thought, Peter had landed

"As Peter opened fire, the observer in the two-seater saw the Americans and retaliated—"

Illustrated by Herman R. Bollin

behind the German lines!

Hearing the German language spoken and realizing his dreadful predicament almost drove Peter frantic. But the worst shock, the queerest break of all lay in the fact that instead of getting credit for a victory, to which he seemed entitled, the German fliers would get credit for bringing him down!

THE soldiers led Peter triumphantly into a nearby house which was the advance medical first aid station. They searched him for hidden weapons and army orders, then took his flying clothes and Sam Browne belt. The only piece of flying equipment left him was his helmet.

The German pilot was in the house with his gunner, who was shot in the body and mortally wounded. The pilot was furious and demanded that Peter be shot because, as he said, Peter had wounded his observer after they reached the ground. This, however, was not true.

There was an ominous muttering among the soldiers after they looked at the machine guns on the Spad and found them loaded with incendiary bullets.

The scowls and threats of the Germans made it look rather bad for Peter. Finally, though, they quieted down and took Peter back to an old chateau, the quarters of the German corps commander, and here he was questioned.

In the afternoon he was questioned by other officers who spoke English fluently. After this he was herded in with several hundred French soldiers and officers.

Peter was ravenously hungry by this time, having had nothing to eat all day. Finally, when they did give him food, it was a very coarse black bread that had a taste like saw dust. For soup he had some thin lifeless liquid.

Two days later Peter reached Iaon. Here they lodged him in jail, dejected and still hungry.

From Iaon he took what seemed an interminable journey to Germany. For two days and two nights he and some other prisoners were on a slow train that stopped for hours on sidings or drew up at stations for such food as they got.

Their destination, Rastatt in Baden, was reached late on August 1, and they slept the first night in a damp, cold fort.

On August 2 Peter was removed to the officers' prison-camp at Rastatt, where he found many French and British officers and the Red Cross, which furnished him some palatable food—a real treat after his starvation period.

To Peter the days in this drab German prison-camp were forlorn and full of a piquant bitterness. It was true that he had company—too much of it, but he looked at the grey walls and then dreamed of good food, pleasant open fields, Paris, the rush of an airplane through soft air.

Just memories and vague hopes they were, for at this period peace seemed a far-off caprice of a war-mad world.

Robert Taylor has furnished an interesting account of life at Rastatt. "We were all obsessed with the idea of escape," he says.

"The possibility and hope of gaining freedom fashioned our every action. Many of us had spent two years or more in prison, but nobody could become wholly reconciled to such an existence and we considered every possible means of escape.

"I shall never forget Puryear for many reasons. I remember the day he arrived, and the hopeless—but to me extremely ludicrous—expression on his face when he made a thorough sur-

"Nobody could become reconciled to prison existance, and we considered every possible means of escape."

vey of Rastatt and discovered what a difficult job it would be to effect an escape. In fact, few succeeded in getting away across the 100 miles to Switzerland.

"When Peter saw me looking at him, his expression changed quickly and a smile began to play about one corner of his mouth.

" 'The boy who built this,' he said, 'certainly was the devil's own architect. I favor putting cactus needles in his mattress—or perhaps we should boil him in oil.'

"But one day Peter discovered a way to escape and he soon persuaded Andre Conneau, a Frenchman, to join him in making a break for liberty.

"Their plan of escape was not particularly complicated, yet it was very dangerous. The guards at Rastatt were holy terrors and had intimidated a number of possible prison breakers by shooting freely and asking questions afterwards.

"I felt that Conneau and Peter had about one chance in six of getting out of Rastatt successfully and probably one chance in fifty of reaching Switzerland. To travel one hundred miles through enemy territory by night would be a Herculean task.

"The two lines of sentries formed the real obstacles to escape. One fellow paced up and down by our windows, another followed the electric lights strung along a path some distance from the walls.

"Peter and Andre expected to leave the prison by a window. We had a bountiful supply of files and saws on hand, smuggled in by an Alsatian guard.

"After some diligent observation we discovered the exact number of minutes it normally took a sentry to walk from our window to the far end of his beat and back again.

"Peter considered it possible to crawl out the window and reach the ground by a rope while the guard was making this round trip.

"Concluding that we couldn't make Peter and Conneau change their minds about attempting an escape, everybody set to heartily and gave them every possible assistance.

"ONE morning in August, Conneau and Peter had a whispered consultation and concluded to make the attempt that night. In five minutes all of us knew it and began to figure how we should help.

"The plot boiled down to this: several men were to take their places at windows further down the line and report on the progress of the sentry. These men were to signal whether Conneau and Peter should proceed or return.

"All lights were extinguished at ten o'clock, and the attempt was set for soon thereafter.

"The lights flickered out promptly. Everybody stood by. I had volunteered to assist at the window where they hoped to make an exit. I shall never forget Peter. I couldn't see him plainly, of course. But I could feel his personality like an electric wave.

"Confidence and determination seemed to flow from him. No walls could have held him that night. However, he betrayed some excitement, and who wouldn't? I was fearfully on edge myself and taking no risk whatever.

"Presently, when the 'Go Ahead' signal was given, Peter threw out the hope, which we had fastened to a bar, and began to climb through.

"Peter was partially out when the signal to come back was given. It was an exciting moment, and he just managed to dive inside and retrieve the rope before the sentry came abreast.

"On the next attempt he was almost down when the cry of warning sounded. Too late to turn back now so he jumped. We drew the rope in hurriedly. Later Conneau made a similar exit and joined Peter, who had been waiting for him."

Their journey began immediately. Stepping briskly along, they skirted the edge of the forest until daybreak and then used it for a hiding place. Completely exhausted, they found a sequestered spot and were soon fast asleep.

Around three o'clock in the morning of the third day out they walked into a sentry. It was humiliating, of course, to be taken without a struggle. But they were too weary to run, so gave themselves up.

(*Continued on page* 60)

New Rocket Control Demonstrated

JOHANNES WINKLER, German rocket inventor, recently startled projective enthusiasts with a new device that permits a rocket to be controlled from the take-off to the point of landing.

Heretofore, rockets have always been fired without a definite landing place pre-arranged.

Winkler's device has a length of 28 inches, a diameter of 19 inches, and is propelled by a combination of liquid oxygen and gasoline. In demonstrating his device, the inventor calculated a wide arc with an extreme height of 3,000 feet and 660 feet from starting point to point of landing. Having fixed the points carefully, the rocket was set off by electrical impulses.

It zoomed for a half minute in its prescribed arc and then fell exactly on its charted course. As Winkler had not progressed far enough in his experiments to provide landing gear and had not planned a safe landing of his rocket, it was demolished.

Squadron Flies in Formation Over Dark Route

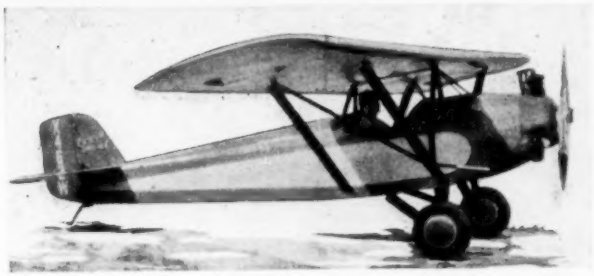
DEMONSTRATING the military practicability of night cross-country flying, the 17th Pursuit Squadron of the army flying corps, consisting of 18 pursuit planes and accompanied by a Ford tri-motor transport carrying six mechanics, recently arrived in Washington, D. C., in exactly two and one-half hours after taking off from its base at Selfridge Field, near Mt. Clemens, Michigan. Crack trains require more than 16 hours to make the run from Detroit to Washington.

The squadron encountered almost perfect flying conditions and maintained an average speed of 170 miles an hour during the entire flight. There was no ground haze and although there was no moonlight to make ground objects distinguishable, the lights of towns and cities enroute were very distinct. A tail wind which materially aided the flight was encountered at Sandusky, Ohio, and continued to Washington.

"The squadron, averaging a speed of 170 miles an hour," it is reported in a bulletin issued by the office of the chief of the air corps at Washington, "arrived over Washington in two and one-half hours from the time of take-off and circled the city in close formation and then in column. The landing at Bolling Field was made in elements of three planes each, and the last pursuit ship had barely taxied up to the line before the tri-motored transport arrived.

"The flight clearly proved that a pursuit squadron can successfully move at night over unlighted airways with full equipment and accompanied by mechanics in transports. The flight did not require any unusual preparation, and no special equipment was used."

Lightplane Available as Either Open or Closed Model



The Corbin Baby Ace open plane is an attractive single seater designed for the home builder.

THE Baby Ace, now known as the Corben Baby Ace, has made its reappearance in the sport plane field. It has been redesigned so it may be built by the average young man, or may be purchased flyaway, at a reasonable price.

The Corben Baby Ace is offered in open or closed models with nearly all parts interchangeable. Parts are semi-finished or completed with choice of welded steel or plywood and spruce fuselage. The plane is powered with the Szekely or Continental motors.

Open Plane

Span	25'3"
Height	6'
Length	17'6"
Chord	4'6"
Weight, empty	450 lbs.
Useful load	350 lbs.
Cruising speed	85 m.p.h.
Service ceiling	15,000 ft.
Rate of climb	700 ft. per minute

Closed Plane

Span	27'8"
Height	6'
Length	17'5"
Chord	4'6"
Weight, empty	500 lbs.
Useful load	300 lbs.
Cruising speed	80 m.p.h.
Service ceiling	15,000 ft.
Rate of climb	700 ft. per minute

The above figures are based on a 35 h.p. engine weighing 150 lbs. These planes may be flown with any motor of 30 h.p. to 45 h.p.

One of the outstanding features of the Corbin Baby Ace is the interchangable wings, controls, landing gear and tail group on either of these planes. The fuselage and wing struts are the only parts necessary to replace in changing from the open to the closed plane.

These sport planes will be supplied in knocked down kits or complete flyaway.

With slight modifications, the Corbin Baby Ace can be made as a neat cabin plane.

Fokker Develops Mystery Fighting Plane

A NEW military "mystery" plane is being tested secretly at the Fokker plant, Hasbrouck Heights, N. J. It is understood the plane is designed to spray a leaden hail of death and destruction from its armored wings as it rakes low over the earth at three and a half miles a minute.

The bullets will pour from the leading edge of the wing, where four machine guns are hidden in the metal covering with only their noses protruding. The four guns, fired together, would spray 3,000 shots a minute. The machine also will carry a fourth of a ton of bombs under its wings.

Autogiro Receives A.T.C.

ON APRIL 2nd, the PCA-2 model Autogiro was granted an Approved Type Certificate No. 410 by the Aeronautics branch of the Department of Commerce.

The Approved Type Certificate is the highest endorsement given by the Department of Commerce to commercial aircraft. Autogiros had heretofore been flown under either the experimental or restricted licenses granted to craft of special nature. It was not until the final program of research work into the engineering of the PCA-2 model was completed to their full satisfaction that Pitcairn Aircraft, Inc., submitted the machine for the highest license.

The Franklin Two-Place Sport Trainer

DESIGNED primarily for the individual, business representative, sportsman, flying club, school and student pilot, the Franklin Models 65, 70, 85 and 90 are all two-place dual control, open cockpit land biplanes with the following engine installations respectively:

Lambert Velie M-5 (65 h.p.), Le Blond 70, Le Blond 85 and Lambert 90, with a range of 65 to 99 h.p. One of the outstanding features of the Franklin is the interchangeability of engines using the same motor-mounts which are detachable.

Prices for the Franklin Models are from $2,885 to $3,350. The specifications for the Model 65 follow:

Top speed	100 m.p.h.
Cruising speed	85 m.p.h.
Landing speed	30 m.p.h.
Rate of climb	550 ft./min.
Cruising range	350 miles
Span	26 ft.
Length	19 ft., 6 in.
Height	7 ft., 9 in.
Gross weight	1,312 lbs.
Net weight	845 lbs.
Useful load	467 lbs.
Gas capacity	18 gals.
Oil capacity	2¼ gals.

New Device for Blind Landing

ONE of the latest developments for flying in fog has been announced by British experimenters. It is a weighted cord which the pilot drops overboard when attempting a landing.

Hanging just ten feet below the lowest portion of the plane, a weight on the end of the cord closes an electrical circuit when it strikes the ground, which in turn lights a small red light in the cockpit of the plane. When this red light comes on, the pilot knows that he is just ten feet above ground, and that it is time to level off.

By means of his instruments he is able to keep the plane level, and with the aid of this cord and weight all doubt as to the proper time to level off is removed, and a safe landing blind is possible.

Plane Travel Popular

THEY like to travel by plane. An eastern air transport machine going down the Atlantic coast from New York recently carried a couple celebrating their fiftieth wedding anniversary, also a little girl 4 years old and a woman 80, each traveling alone.

Over the city of New York an engagement party was held in a plane a few weeks ago. On Easter Sunday three folks aged 96, 86 and 84 took airplane rides at Roosevelt Field, N. Y. A ten-day-old girl, daughter of George Meissner, a war ace, rode with her father from New York to her home in Stratford, Conn. Near The Pas, Manitoba, Canada, a boy was born 4,000 feet in the air.

Landing Flares to be Tested

ILLUMINATING flares to be used in conjunction with licensed aircraft carrying passengers for hire at night must now have the approval of the Department of Commerce.

A flare, as used in connection with aircraft, usually consists of a slow burning material giving an intense light suspended from a small parachute released to light the ground at night when a landing is necessary in the absence of a ground lighting system.

The flares submitted for approval will be tested in the field by engineering inspectors of the Aeronautics Branch. The method of testing will consist merely of dropping the flares and timing the period of descent and period of illumination and gaging the intensity of the illumination.

The requirements as adopted by the Aeronautics Branch stipulate that five flares of each type for which approval is asked, be submitted for test. In the event there is one failure out of the five submitted, five additional flares shall be presented for test. Failures of two or more flares out of ten dropped are grounds for disapproval.

Flares for aircraft carrying in excess of two passengers for hire shall have a light duration of at least three minutes and a candlepower of 500,000 or more. The rate of descent shall not exceed 550 feet a minute.

Flares may be approved for aircraft carrying two or less passengers for hire which have a burning duration of one minute or more and whose candlepower is 200,000 or more. The rate of descent shall not exceed 550 feet a minute.

Aerial Box Seats

SEVERAL air-liners of the Imperial Airways were fitted this year with equipment which, for the first time, enabled passengers flying over the famous Oxford-Cambridge boat-race to hear from the air, as well as to see, the progress of the contest.

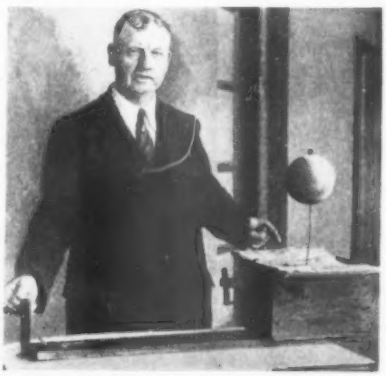
As they sat at the windows of the aircraft cabin, identifying the crews below by the glint of the light blue or dark blue oars, the passengers had headphones at their ears connected with a special receiver in the front of the machine.

This instrument picked up, and transmitted to the passengers up in the air, the running commentary on the race which was broadcast from a launch following the crews.

Captive Balloon Forms S. O. S. Signal

LOST airplanes would fly their own S. O. S. signal through the use of a device recently completed by T. H. Furman of Rialto, Calif.

Furman's idea calls for placing in the tail end of the fuselage a small box with a lid that works on a spring. The box contains a small brilliantly colored gas balloon. The lid of the box is opened by a cord operated from the pilot's cockpit.



Inventor Furman demonstrates his safety device.

"In case of a forced landing," said Furman, "the pilot could release the captive signal balloon, or in the event of a crash the shock would break the connection.

"The balloon would then rise and float about the wreck, anchored by a light wire, and signaling that there was trouble below."

Planes Carry Odd Freight

ARTICLES of unusual nature have found their way into the air recently through a coast-to-coast air express service. One was a saddle of English mutton consigned to Dr. Albert Einstein, the German scientist, while on his visit to California. The saddle was ordered from England, brought to New York by steamer and dispatched by air to Los Angeles.

XUM

The Hazard of Aerial Collisions

A moment's carelessness—then, grim tragedy! But even "unavoidable" accidents can serve a purpose if, by studying them, we can avoid future pitfalls.

Here, the author describes and analyzes several collisions and near collisions.

by W. L. OLIVER

COLLISIONS are the dread of the airman. Other hazards he can escape: he can sideslip and blow out a fire, he can land right side up when his motor conks over rough ground, he can dodge storms by circling them or turning back, even in fog he can fly blind if his craft is properly equipped.

But collisions are different A shadow speeds swift as thought, a ripping smash follows before mind or hand can act.

Four army air service lieutenants from Chanute Field, Illinois, were playing about in the air in two planes one fine December day in 1925. The day was ideal for flying, with just enough spotches of thick cumulus clouds about 2,000 feet up to make air cruising interesting. The four were putting in flying time, adding to their individual hour-records.

Two of the lieutenants were in a Consolidated Husky PT-1, or primary training plane, the craft which took the place of the old Curtiss JN-4D, or "Jenny," used during the war to train fliers for service on the battlefront. This ship was powered by a 180-horsepower Hispano-Suiza motor, as was the second plane, a Huff-Deland AT-1, advanced training ship.

All four of the officers had had many hours of training and were considered as competent as any average army fliers. They were in frolicsome mood, however, and grew a little careless. The pilot of the Consolidated momentarily lost sight of his companion as he dipped in a sweeping left bank downward and plunged into a thick, heavy cloud.

The results of a mid-air crash. Two Army planes being hauled away from Rockwell Field.

The Huff-Deland just then was coming from the Consolidated's left, flying straight toward the cloud, with the pilot looking forward to the momentary blanketing of earth, sky and sun as his ship swept into the soft and billowy whiteness.

The two ships met, as others have done in other clouds, and four fliers paid with their lives for a brief bit of carelessness.

The two craft, splintered and broken, were hurled apart by their own momentum and fell to the ground, thousands of feet below, about 25 miles from the home field. Another flying crash was checked up to errors in judgment.

These fliers had made a mistake which was one of the commonest of errors in the old days of flying—plunging blindly into a cloud bank when there was the chance of another ship heading into the same cloud.

Fliers nowadays are watching this, as well as scores of other possibilities of fatality, and are gradually reducing the chances of collision from this cause.

They have learned the story of clouds, not only to avoid meeting other craft, but to avoid rain which may temporarily decommission the magneto or short-circuit ignition lines; to avoid ice formations, which change the curve of the wings and bring good pilots down when they had rather stay up; to avoid snow, with its menace of enforced blind flying when conditions are unsuitable for blind flying; to avoid fog, whose clinging shroud may easily become a garment of death.

FROM time to time figures are compiled by various agencies which attempt to show the causes of air accidents and thereby get at the remedies. Pilots, while admitting that figures cannot lie, also admit that you can prove anything by statistics.

But practically all of them consider government figures authentic, particularly those of the Navy and Commerce Departments.

Figures published some months ago by the Navy Department showed that there were fewer accidental deaths from aviation causes than from either drowning or suicide. Aviation deaths were admitted to be spectacular, but not holding a high percentage either in the Army or Navy records.

Douglas Johnson got out of this crash O.K. But his plane didn't; the oak tree refused to move.

An analysis of 1928 fatalities by the Department of Commerce brought the discovery that only 8 per cent of all airplane crashes were due to structural failure. Most smashes were due to poor judgment on the part of the pilot.

A circular from the Department in this connection says that in most cases accidents could have been averted by "proper preparation for flight, better training for pilot and closer supervision over placing of responsibility."

Collisions are much rarer in the air than the layman would suppose, when he considers the constant presence of this danger, particularly around large flying fields. To the pilot goes all of the credit for escaping this menace. And it is due solely to the uniformly high type of men aviation has drawn that crashes of this type are not more numerous.

Airplanes of today cruise at from 100 to 140 miles an hour. That means a speed of 150 to 210 feet a second. At that speed there is far less than "a second to think" when two planes are carelessly allowed to come too close together.

The government has tried to help this situation by ruling that no two planes shall approach each other nearer than 300 feet while in the air—battle formation flying excepted. The airplane manufacturer has tried to do what he could by improving visibility on all sides of the pilot's seat.

At times, the plane maker has gone perilously near the border line of safety in designing struts and supports to be placed at angles which aid the pilot's vision more than they strengthen the plane. The Department of Commerce here maintains a watchful eye

and sees that all reasonable standards of safety are observed.

Even with all these precautions collisions occasionally happen. When they do, there is no other course left for occupants but to leave the plane except in the too frequent cases when pilot or passengers have been injured or killed, or in the too rare cases when the damage is so slight that one or both planes may be brought safely to earth. In military and naval flying parachutes are required; in commercial flying they are rarely worn.

What little is left of a plane after the crash soon gets into the hands of the souvenir hunters.

With the large air transportation companies, the danger of collision is practically non-existent, for they employ none but the most advanced type of pilot. However, accidents will occasionally happen to even the large air liners as the following incident shows.

IN DECEMBER, 1928, Senator Santos Dumont, famous air pioneer, was scheduled to pay a visit to Brazil and all Rio de Janeiro and lesser cities of the republic were prepared to do him honor.

Scores of airplanes and seaplanes were mustered at Rio, ready to fly out over the sea to meet the returning native son as his boat neared the harbor. One of the largest of the flying craft was a giant Dornier-Wal seaplane.

The huge plane, carrying two powerful motors, was in charge of a veteran pilot and carried, besides the pilot, a mechanic and twelve representative government and aviation leaders from the Brazilian city.

The air above the harbor, which is one of the finest known, was crowded with craft, many of them carrying sightseers who were eager to combine the thrill of greeting by air a pioneer flier with a trip over the largest and most important commercial city of South America.

The passengers in the Dornier-Wal were up just high enough to look over and down into the main street, the Avenida Rio Branco, which runs parallel with the beach, over to the palace skirting the beach and out to the heavily-buttressed, battery-encrusted mainland and island commanding the entrance to the harbor.

Then tragedy swept their lives away. There was no collision. Merely another ship looming up close at hand whose pilot, foolish or careless, flew his craft too close to the heavily loaded and therefore sluggish flying boat.

The pilot of the Dornier-Wal instinctively tried to swerve his craft to avoid a collision. In doing so he strained his ship and a wing stay somewhere in the huge wing apparently buckled.

The plane slipped out of control, fluttered in a flat spin a moment, then fell into a tail-spin—deadly with this load and at an altitude of only about 300 feet—and plunged into the bay.

Thirteen aboard were almost instantly killed, either by the impact or subsequent drowning in the broken craft. Witnesses later said one motor, still racing, exploded as it struck the water. The wreckage sank immediately and was not lifted until some hours later.

Only the mechanic was rescued alive and he died shortly thereafter. A celebration for a pioneer flier was instantly changed into a period of mourning for his would-be disciples.

DURING the war the greatest cross the allied fliers had to bear were the latest designs of Anthony H. G. Fokker. This designer, a Dutchman, had gone to Germany after, it is said, allied governments had denied him backing.

There the Germans quickly put his almost uncanny faculties for design and construction of airplanes into use. There Fokker built one craft after another, the latest just a little faster and just a little more maneuverable than its predecessor.

The Allies were hard put to it to keep up with Fokker's fliers in the tiny tri-planes which spun and looped almost in the space required for a large hangar. After the war Fokkers were studied by the victors and some were brought to this country.

Flying battle formations continued to be studied and it was while engaged in practicing one of these near Quantico Marine Barracks, 35 miles south of Washington, D. C., in April, 1922, that two planes met and three men died.

First Lieutenant Earl M. Randall, Marine, was piloting the Fokker. Second Lieutenant Duncan W. Lewis was piloting a Vought, product of Chance Vought, veteran American designer and builder. Lieutenant Lewis had with him as observer Private Joseph J. Phooge.

The planes were maneuvering about each other at an elevation of between 3,000 and 4,000 feet, the Fokker trying to "get on the tail" of the Vought and the observer of the latter trying to bring the enemy down with dummy machine-gun fire.

The pilots flew too close, as happened many times over the Western front during the war, and the planes collided. They fell apart and dropped out of control, the Vought landing on an iron storehouse in the Marine Corps Reservation, the Fokker ripping through telephone wires and smashing itself to bits on the railroad tracks nearby.

The occupants had no chance of escape and died in their seats. Today, those fliers, in a similar crash, if unhurt by the collision would slip over the side, pull their parachute rip-cords and, barring entanglement with the broken plane, come safely down.

When Uncle Sam decided in 1926 to send a group of five planes on a good will tour of South and Central America, the Loening Amphibian was chosen. Each craft was named after some large American city and veteran Army Air Corps fliers were chosen for the cruise.

A 20,000-mile trip was planned and this had been followed, without major mishap, until it had been about half completed.

The aircraft of the "Pan-American Good Will Flight" arrived in Buenos Aires, Argentina, after leaving Mar Del Plata, the Argentine summer capital, on the morning of February 26, 1927. Everywhere the fliers were being feted and dined by the nations of the sister Americas.

The good will flight was bearing the fruit it was intended to bear. It was bringing about a closer spiritual union between the nations to the south of us, which had long looked with varying disfavor on our own government, and the country which the fliers represented.

These smaller republics saw in our fliers the spirit of romance and adventure which clings to all fliers, regardless of nationality, and they were opening their arms and hearts as they never would have done to the more formal representatives of studied diplomacy.

Yet there was something lacking, something which was not realized until the crash which killed Capt. Clinton F. Woolsey and Lieutenant John W. Benton released it.

One more candidate for the aerial junkheap. The lessons learned in these crashes are forming the basis for future safety in flight.

Death is said to make all people kin. These two probably accomplished far more by their deaths than could possibly have been achieved by an unmarred air tour of the nations.

Shortly after the five planes landed in the harbor at Buenos Aires they took off again and headed for Paloma Flying Field, 15 miles from the city. They were coming down and turning

(*Continued on page* 50)

XUM

Pitcairn Awarded Collier Trophy for Autogiro Development

THE Collier Trophy award for 1930 has been made to "Harold F. Pitcairn and his associates for their development and application of the autogiro and the demonstration of its possibilities with a view to its use for safe aerial transport."

Each year this award is made by the National Aeronautic Association "for the greatest achievement in aviation in America, the value of which has been demonstrated by actual use during the preceding year."

It is expected that following a custom long honored by the nation's chief executives, President Hoover will make formal presentation of the Trophy to Harold F. Pitcairn and his associates at a brief ceremony at the White House.

Although there were many achievements in aviation during 1930, including several that were outstanding, the committee was unanimous in its report that the development and application of the autogiro was the most noteworthy.

The Collier Trophy was donated by the late Robert J. Collier. It was first awarded to Glenn H. Curtis in 1911 for his development and demonstration of the hydro-aeroplane. Orville Wright, the world's first pilot, received the award in 1913 for the development and demonstration of his automatic stabilizer.

Awards for the last three years were: 1927, Charles L. Lawrence for development of radial air-cooled aircraft engines; 1928, Aeronautics Branch, Department of Commerce, for development of airways and air navigation facilities; and 1929, National Advisory Committee for Aeronautics for development of cowling for radial air-cooled engines.

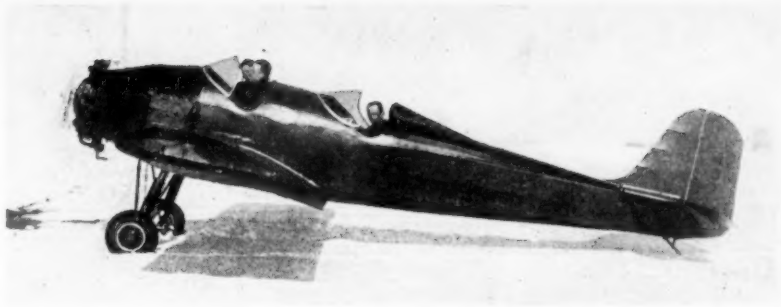
Mr. Pitcairn brought the first autogiro to the United States in 1928. He had been interested in this new type machine since its invention in Spain by Juan de la Cierva. At Madrid in 1925 he witnessed his first autogiro flight and became convinced that it could be of real value to the American citizen.

Cross-country flights started soon after the first machine was brought to the United States. Last August two American-built machines of an advanced type and the result of extensive development work at the Pitcairn factory flew to the 1930 National Air Races at Chicago, making the seven hundred mile air journey in less than seven hours flying time.

In January of this year a 300 horsepower model was flown from Philadelphia to the All-American Air Races at Miami—a fifteen hundred mile trip which was accomplished easily under unusually severe weather conditions.

New York has been visited a number

(*Continued on page* 54)



Nicholas-Beazley Introduces New NB-4

THE NB-4 manufactured by the Nicholas-Beazley Airplane Co. is a development of the well-known Barling NB-3.

This year's model shows improved fuselage streamline, a newly designed hydraulic landing gear and numerous other refinements in detail.

The NB-4 is a 3-place job and shows the same high performance that enabled the NB-3 to capture the American altitude record and the world's non-stop record for lightplanes.

Two engines are available as standard equipment on the NB-4. The plane sells for $3900 with either the 90 h.p. Warner Jr. or the 90 h.p. Lambert R-266 engines. The performance is the same with either engine.

Weight empty	861 lbs.
Useful load	683 lbs
Gross weight	1544 lbs.
Ceiling, service	16,000 ft.
Climb, rate per min	800 ft.
Landing speed	42 m. per hr.
High speed	105 m. per hr.
Cruising speed	87 m. per hr.
Fuel capacity	24 gal.
Oil capacity	2½ gal.
Endurance	4¼ hrs.
Span	32 ft. 8 in.
Chord	5 ft. 2 in.
Length	23 ft. 4 in.
Height	6 ft. 11 in.

A Radical Lightplane

This unusual wing proved unsuccessful. The plane never flew.

C. A. ARMS, of No. Canton, Ohio, sent us this photograph, but failed to identify the designer of this odd appearing little plane which made its appearance at the Massillon airport recently. Mr. Arms writes:

"The little airplane is someone's idea of how a Heath Parasol should be built if you want it to be a 100 per cent parasol and fold up—which it did while taxiing.

"It stubbed its toe and fell completely over on its back. Although no damage was done, it never flew."

1930 Lightplane Statistics

DURING 1930, 330 lightplanes were built. Of these, 100 were Aeroncas, 55 were Heaths, 32 were American Eaglets, and the remaining 143 were of miscellaneous designs.

A market for between 500 and 1,000 lightplanes is estimated for this year.

The World's Largest Landing Struts

BUILT to support a transport plane carrying 50 passengers, or a maximum normal load of 25,000 lbs., the greatest load thus far conceived for American heavier-than-aircraft, the world's largest shock-absorbing struts have been constructed by the Cleveland Pneumatic Tool Co.

They weigh 142 lbs. each, have a seven-inch diameter and have an extended length of 113 inches, topping the average man's height by 45 inches. In flight they can be retracted to 64 inches, their minimum length. They are so large tnat a strut, designed for an ordinary-sized transport plane, will be used with them as a tail skid shock absorber.

The smallest struts of the same make are units, weighing two pounds each, which were built for Frank M. Hawks' speedy Mystery Travelair, the Texaco 13. Collapsed, they are less than ten inches in length and in flight position are 14 inches long. Four of these, two for each axle, were installed on his plane before he left for Europe.

Aerol struts, invented by J. F. Wallace, chief engineer of the company in 1926, are telescoping cylinders, inflated with air, just as are pneumatic tires. They are placed between the axle and fuselage to absorb the shocks of takeoff, landing and taxying. Within the cylinder is a piston and valve mechanism that absorbs the shock through the use of compressed air and oil.

The Empire State Mooring Mast

—*and how it works*

Dirigibles may become the accepted mode of travel if this experiment is a success.

by V. VON COLLER

AS THE Empire State building, the world's tallest structure, is being rushed to its completion on the site of the old Waldorf-Astoria, at the corner of Fifth Avenue and Thirty-Fourth Street in New York City, thousands of curious passersby crain their necks and wonder how it will be possible to moor a giant zeppelin to the yet unfinished tower, rearing its steel cranium more than a thousand feet towards the sky.

The builders of this neck-breaking pile of Indiana limestone and resilient steel have announced their intention to furnish the largest airships a haven of refuge on the top of this already famous building. In the near future one of the most perplexing problems of modern aeronautics will be solved.

The idea of mooring an enormous cigar-shaped, gas filled envelope in a thickly populated city would be atrocious—if the gas were explosive or inflamable as in the first zeppelins.

But fortunately, we in the United States are blessed with a natural source of helium gas, non-inflamable, and with a scientific method of cleaning and reusing it—making it commercial. Thus it is raising no hazard to the metropolitan area to bring these leviathans of the air into the centers of population.

If it were not that the Empire State building was so much higher than its neighbors, there might be some question of wind and back drafts making the ship slide around too much. However, the Empire State building reaches up about 900 feet above any of its neighbors, making this feat a possibility without any danger of striking surrounding structures.

The Empire State Building in the heart of New York is the world's tallest structure.

THE tower on the very top of the Empire State building extends upwards eighty feet above the building proper. Near the very apex there is a small circular landing platform about twenty feet in diameter (A). Up to this platform are elevators from the ground, and from this platform a gangplank can be extended into the forward end, or the bow of the zeppelin.

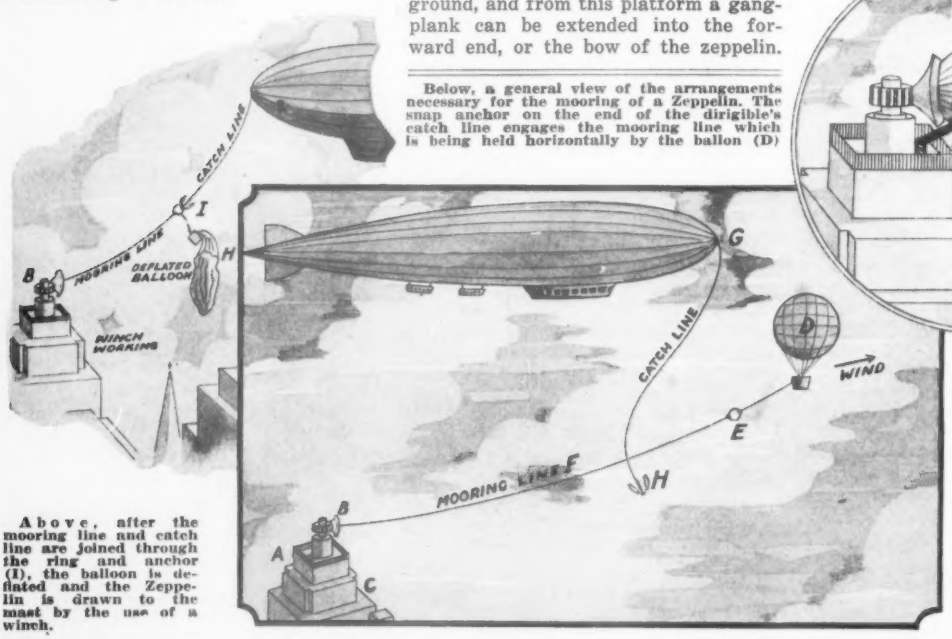
Thirty feet above this landing platform is a revolving universal cup-shape nose piece (B). This cup-shaped aluminum guide fits onto the foremost end of the zeppelin. It is the muzzle or nose piece that holds the airship on the top pin of the mooring mast. It revolves as the wind veers and thus allows the zeppelin to always point its nose into the wind permitting the least resistance and the best mooring position.

With the larger end of the zeppelin facing into the wind, the scientific streamlining comes into play, allowing the wind to sweep past the cigar-shaped hull with the least resistance—the large end foremost. In this manner the giant craft rests in its easiest position with the least strain on the mooring gear and mast.

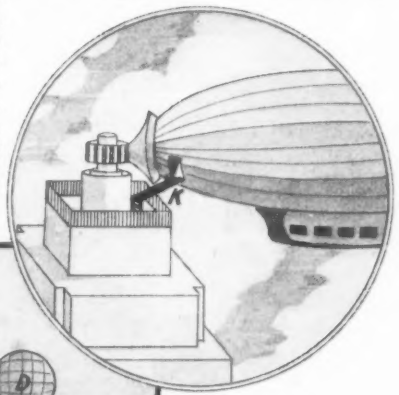
From the center of the cup-shaped nose piece is a cable which extends down into the mooring mast to a winch still lower down (C). The other end of the cable is attached to a captive balloon (D).

Following along the line that attaches the balloon to the mooring nose piece is a flexible electric cable which is similar to those used in elevator controls. The operator on the landing platform, who is to manage the landing, turns the lever on an electric control similar to that in an electric trolley car and cuts in different circuits in the flexible cable.

These circuits energize magnetic valving mechanism in the captive bal-



Below, a general view of the arrangements necessary for the mooring of a Zeppelin. The snap anchor on the end of the dirigible's catch line engages the mooring line which is being held horizontally by the ballon (D)



Above, The completed mooring. The nose of the Zeppelin is held by a universally jointed nose piece which allows the Zeppelin to turn with the wind. A light gangplank from the ship's nose to the landing platform forms the only means of communication with the ground.

Above, after the mooring line and catch line are joined through the ring and anchor (I), the balloon is deflated and the Zeppelin is drawn to the mast by the use of a winch.

loon. Thus the pressure of the gas is maintained in the balloon at a balance so as to elevate the balloon to just the height of the mooring mast. And as a wind is always blowing, it is blown to one side as at the position (D) in the sketch.

Near the captive balloon there is a ring about two feet in diameter inserted in the line from the nose piece to the balloon. This ring is shown at (E). The mooring line, i. e., from the nose piece to the captive balloon is kept as near horizontal as possible and is shown at (F).

From the bow of the zeppelin dangles a long catch line (G). It is about four hundred feet long, and at its lower end is a snap anchor (H). This snap anchor has three hooks which can hook over the mooring line.

From the stock of the anchor to the point of each hook is a spring piece, or snap, similar to a dog leash snap hook so that once the hook catches the mooring line or the ring it is positively coupled.

As this anchor engages the horizontal line it slides along the mooring line to the ring, and snaps into place. Now the zeppelin is caught, and it remains only to warp it into the nose piece on top of the mooring mast.

Next the balloon is deflated by the electric valving mechanism. The anchor has already been caught in the ring, as indicated at (I). Then the winch is started down in the mooring mast, and the horizontal mooring line is pulled in.

The ring pulls the anchor, the anchor, the catch line, and thus the zeppelin is pulled nose first into its cup-shaped nose piece (B).

The deflated balloon, as shown at (H), is of course unhitched as it comes into the mooring mast and platform.

The bow of the zeppelin is reinforced for anchoring and fits perfectly into the cup-shaped metal retainer. A mechanical coupling is accomplished at the other side of the cup-shaped piece by a full universal clevis to the mast proper.

Thus with the nose of the zeppelin firmly in the universal cup, the gangway (K) is lowered. The arrangement of the inside of the zeppelin is such that all parts of the cabins, the control nests, gondolas, etc., are accessible to a central "catwalk" or pathway along the central aluminum fabricated frame that forms the keel of the aluminum structure.

This walk is about 14 inches wide and is the only means of inter-communication on the inside of the airship. This walk terminates in the forward end near a trap door which when open makes a hole three feet wide and four feet long and allows one to look down on the earth.

Through this door is placed a gangplank, light in weight of course and resembling two skiis lashed side by side. In this manner the passengers

(*Continued on page* 49)

Unusual Powered Glider Flies with 8 h. p. Motor

This English Glider can do 50 m.p.h.

ABOUT a month ago we were looking through some foreign publications and came across a picture of a very unusual looking little plane.

It had been built by Handley Page, Ltd., and as there was no further description of the plane, we wrote to England to find out more about it.

About a week ago we received this photograph and the following letter from the manufacturers:

"We are in receipt of your letter and note your interest in our powered glider.

"This little machine was built some six years ago for the purposes of a competition for such aircraft, and the following are some of the technical particulars which may interest your readers. You will understand, of course, that we have no intention of placing this glider on the market, and therefore are not quoting any price.

"It is a cantilever monoplane, with the wheels in the fuselage, capable of a speed of fifty miles an hour with an A.B.C. flat twin engine of 8 horsepower.

Wing area	158 sq. ft.
Weight	450 lbs.
Span	36 ft., 6 in.
Length	21 ft., 3 in.
Height	4 ft., 2 in.

Navy to Build New Aircraft Carrier

THE navy's new airplane carrier will be the first vessel constructed in America to be originally designed as such. The contract for building this floating landing field was recently given to a company that bid $15,560,000. About $4,000,000 more is to be spent on armor and armament.

The CV-4, unlike the carriers which preceded her, the Langley, Lexington and Saratoga, will be built from the keel up as an airplane carrier, whereas the three other vessels of her type are converted ships.

Although the CV-4 is to cost less than half as much as the Lexington and Saratoga, she will have the same utility. In her capacious hold and on her broad flight deck this 13,800-ton carrier will be able to care for as many planes as either of the larger ships.

Cup Offered for 625 m.p.h. Flight

A CHALLENGE cup, valued at $4,000, has been offered by M. Bleriot, the French pioneer aircraft manufacturer, to the first man to attain a speed of 625 m.p.h.

No stipulation has been made regarding the method to be employed, nor the type of aircraft to be used.

The present world's speed record, stands at 357.7 m.p.h., but M. Bleriot is confident not only that this figure will be eclipsed this year, but that his trophy will be claimed within the next three years.

New All-Air Transcontinental Service Opened

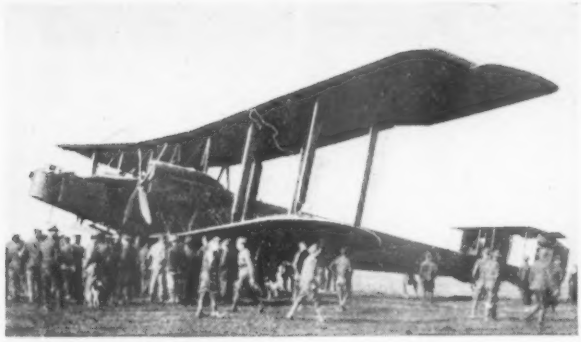
THE nation's first "day and night" air mail-passenger service between the Atlantic and Pacific seaboards became operative April 1, when National Air Transport and Boeing Air Transport inaugurated trimotored passenger plane schedules of twenty-eight hours eastbound and thirty-one hours westbound between New York and San Francisco. The twenty-eight hour schedule between San Francisco and New York is contrasted with 78 to 96 hours by train.

Passengers leaving New York at 9 A.M. are scheduled to arrive at San Francisco, 2,760 miles away, at 1:18 P.M. the following afternoon. Eastbound, passengers leave San Francisco at noon and are scheduled to arrive in New York at 7:24 P.M. the following evening. The trip eastward is three hours faster than westward due largely to prevailing winds.

While the Boeing planes on the night divisions do not have berths, the transcontinental passengers can rest in reclining, adjustable chairs. There are individual reading lamps. Pillows and blankets are available for those who desire to sleep.

Passengers are served meals in flight and at ground depots. The westward traveler has breakfast in New York, lunch in Chicago, dinner while flying over Iowa City, a midnight lunch at Cheyenne, breakfast at Salt Lake City and lunch at San Francisco. Fares are approximately eight cents a mile.

Above, the B. E.-2C (England). Below, the Salamander (England).



Above, Handley-Page (England). Below, the Salmson (France).

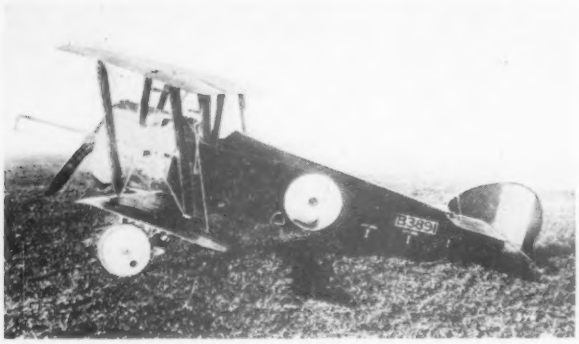


Photo U. S. Signal Corps.

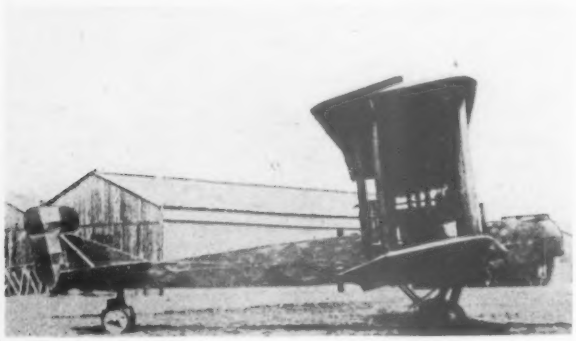
Famous Planes of the World War

A second series of photographs of famous planes that have made world history.

Photos Courtesy R. H. Martin, Hollywood

Above, Bristol Fighter (England). Below, Gotha Bomber (Germany).

Above, the R. E.-8 (England). Below, the S. E.-5 (England).



Facts about the Famous Spad 13

A description of one of the most widely used and successful planes of the World War.

by MANLEY MILLS

READERS of POPULAR AVIATION who enjoy the World War stories appearing from time to time will probably be interested in some intimate details of the Spad pursuit plane.

Although this ship was of French design, many were built in this country and were powered with the Wright-Hispano 220-h.p. motor. This type was known as the Spad 13 and was widely used by American flyers.

Its overall span was 26 feet 3¾ inches, with a chord of 4 feet 7⅛ inches, giving it a total area of 227 sq. ft. Its overall length was 20 feet 4 inches and its height 7½ feet.

Its weight empty, including water, was 1,464 pounds and weight loaded was 2,036 pounds, giving it a wing loading of 9.5 pounds per square foot, and a weight per horsepower of 9.16 pounds.

At sea level, its rate of climb was 1,200 feet per minute and its high speed was 131 miles per hour.

Its service ceiling was 18,400 feet, at which altitude the high speed was 105 miles per hour. The high speed was 89.5 miles per hour at its absolute ceiling of 20,000 feet.

The endurance at full throttle at 10,000 ft. was 2 hours and a half. The landing speed was 60 miles per hour.

The Spad was very easy to taxi in a high wind and had no great tendency to ground-loop. It was slightly tail-heavy and was usually taxied with the stick held forward to lessen the weight on the tail skid.

On account of the great engine torque, it was a difficult ship to take-off on account of its tendency to swing to the right as soon as the throttle was opened.

In flight, a good deal of left rudder was required, owing to the pronounced torque but otherwise it was very steady. Its tail-heaviness was evident when flying level, or climbing with wide open throttle, but became less pronounced above 15,000 feet.

The cockpit was very roomy, and was warm and comfortable on cold days or at high altitudes, but on warm days with wide open throttle it was slightly stuffy. The rudder bar was too close to the seat and tired one's legs on a long flight.

The engine was geared, and its incessant whine became very annoying after some length of time.

The engine usually started "acting up" above 16,000 feet and when descending, the pilot had to constantly operate his shutters as the engine was very sensitive to temperature changes. In addition, some parts of the engine were not easy to "get at."

In spite of these faults it also had some good points. It landed easily and stopped short on account of the heavy tail which also kept it from nosing over on rough fields.

Above all, the Spad helped win the war and made a wonderful name for itself in aviation history.

War Time Motors Can Be Replaced

OBSOLESCENCE is something that rarely concerns an individual until he finds it in a corporation financial statement and ponders its definition.

But the meaning of the word is taking on added significance today for some 2,000 individuals. They are the men, or in some cases the women, who possess aircraft fit for a good many more hours, possibly years, of active duty, but equipped with motors which are fast approaching the end of the road and which have no replacement value.

Reference is made to those airplanes powered with the now practically obsolete OX5, unsung hero of the World War which went out of production with the signing of the Armistice. Heretofore owners of ships powered with the OX5 have not found a means of replacing the engine with another and retaining their approved type certificate of the United States Department of Commerce.

They found that their ships had been built to specification expressly for the OX5 and that federal sanction for the planes could not be obtained if another motor were installed.

Following inquiry from several such owners, the Kinner Airplane & Motor Corp., Ltd., tackled the problem of saving such planes from the scrap heap. Investigation revealed that under certain circumstances, the Kinner K-5 100 horsepower engine may be substituted for the OX5 with approval of the Department of Commerce.

Conversion may be made on Alexander Eaglerock, American Eagle, Bird, Swallow or Travelair planes through installation of Kinner engine mounts and cowling.

The Kinner company is cooperating with manufacturers of these five planes in the replacement of OX5's with Kinner K-5s, where owners desire to repower their ship under governmental approval.

This English Fighter Carries Six Guns

ON PAGE 20 of the May, 1930 issue of POPULAR AVIATION, you will find a description of a remarkable English fighting plane built by the Gloster Aircraft Co.

Inasmuch as this plane was built and tested in secret and carefully guarded, we were somewhat surprised this month to receive this photograph of this "mystery" machine, which reached a speed of 200 miles an hour in test flights.

It is virtually a flying gun platform, with six machine guns, controlled in unison from the pilot's cockpit, so arranged that the bullets converge in a cone of fire a few hundred yards from the machine.

This view shows the four Lewis machine guns mounted in the wings. In grooves at each side of the fuselage are two Vickers guns.

Progressive Steps Make Flying Easy

BY making use of the "coordinator" and the "taxiplane," Captain George Rockwell has evolved a new system of flying which, in its earlier stages is almost self taught and beginner's lessons can be taken for as little as a quarter.

The system consists of

1. Exciting short lessons in the coordinator.
2. Thrilling field runs in the taxiplane.
3. Elementary training in gliders before powered flight.

Above, the taxiplane which cannot fly but familiarizes student with controls.

Left, a novice receiving instruction on the coordinator.

4. Dual control flying in the new "Curtiss Junior."
5. Solo flights later to qualify for private pilot's license.

The Coordinator is not the usual "trainer" type of mechanism, but is, in fact, a pivoted glider that can simulate all flying conditions without leaving the ground.

Power is furnished by a prop which is placed in front of it and which is driven by an electric motor. Wind is blown back to the coordinator and the pilot is guided by a red, white and blue line affixed to a bar in front of the propellor, forming the "horizon." He keeps his "radiator cap" on this "horizon" by means of a cross hair that comes up immediately before him from a socket on the glider.

Not only will this machine bank but it will turn a full 360 degrees horizontally.

The "Taxiplane" which is used for field hops develops enough power to swing the tail clear of the ground. It resembles the clipped wing Penguin used for training in France only in that its wings are likewise clipped. An auxiliary wheel under the motor prevents nosing over, while strong auxiliary iron struts on either side and in front of the propellor makes it impossible to turn the ship over.

Towed Flights for Model Gliders

KAREL PEARSON of San Francisco has been experimenting with towing model gliders behind model boats. He thinks there are great possibilities in the idea and offers these suggestions to experimenters:

"Get about 35 feet of strong, waxed thread, which can be obtained at any dry-goods store. Then attach it in the middle of the rear-end.

"In the case of the 'Miss Chicago 1933,' a piece of balsa about ⅛ in. by 3/16 in. should be placed connecting the two rear bulkheads, allowing the thread to be connected in the middle. If it was connected at the side, the boat might be made to travel around in circles.

"Connect the other end to the skid of the glider. Of course, the glider should be equipped with pontoons. Launch the boat and glider into the wind. Give the boat a slight push to give it a flying start."

Cellophane Tested for Wing Covering

ACCORDING to a number of tests recently conducted in Germany, Cellophane is proving valuable as the covering for airplanes.

A glider which belonged to a flying club was covered with Cellophaned-fabric by four workmen in four hours. The reports claim that the first small trials showed that the flying qualities of the machine had improved in an exceptional manner, the "gliding angle" had improved and the resistance against "pulling-over" was increased, which was explained by the smoothness of the material.

The experiment was also made on an airplane which is used regularly at great altitudes to take wind measurements. Part of the rudder was covered with the transparent material. This machine has now been in use for eight months and the Cellophane-covered part does not show the usual defects common after this period.

Telegrams Sent from Air Liners

TELEGRAMS at one mark (23c) per word from plane passengers may now be sent on the Berlin-Dresden-Prague-Vienna air route. This new service was recently inaugurated by the Deutesche Luft Hansa in cooperation with the postal authorities of Germany, Austria and Czechoslovakia.

Ordinary telegrams, not in code, and not exceeding 15 words, may be transmitted from the moving plane to the radio stations of the central office at Berlin and relayed from there by wire to their destinations.

This service will be extended to the Berlin-Vienna express route, on which commercial messages will be accepted beginning May 15, 1931.

Round-the-World Flight Planned

PREPARATIONS are being made for a new round-the-world flight, to start from New York in the near future.

The participants in the proposed flight, which, it is said, would consume no more than 15 days, are Clyde E. Pangborn, a veteran barnstormer, wing-walker and ex-Army Air Corps instructor, and Hugh Herndon, Jr., New York social registerite.

The latest announcement of a new spectacular flight venture indicates that trans-Atlantic flying, so popular in 1927, has become passe, and that the aeronautical thing to do in 1931 is to fly around the world. The existing record for this trip is held by the Graf Zeppelin and some forty-odd persons, who were passengers, officers or members of the crew of the dirigible in 1929.

Upon the occasion of the first favorable weather it was said that the flyers

Pangborn (left) and Herndon look over a map of their contemplated flight.

would take off and would attempt to fly non-stop from New York to Moscow, and from there with two or three stops on the general route of the Trans-Siberian R. R. to Tokyo.

A non-stop trans-Pacific flight will be attempted from Tokyo to Seattle, with a non-stop transcontinental flight bringing the flyers back to New York.

The distance of the Pacific flight is 5,000 miles. The estimated flying range of their new Bellanca plane is 6,400 miles.

XUM

How to Jump from a Spinning Ship

If your ambition is to push up daisies, don't bother to read these valuable instructions

by

Capt. CHAS. W. PURCELL

"HE bailed out." Just "three little words," but, Big Boy, did you ever stop and think what they mean? Just sit down sometime and see what you can suppose from those. The guy who wrote that "three little words" love song didn't mention the half of it.

"He bailed out" are the three biggest little words in the whole cockeyed world, and the author thinks they should amend the Constitution of the United States and put them in.

A lot of you Palookas take yourself on a hop all dressed up in a chute pack, and I'm willing to bet there isn't one out of a hundred of you that would know how to get out of a ship under the many different conditions that you might find yourselves mixed up in.

Oh, yea! Sez you! Well, fold back your ears, rookie, and stop scratching yourself. I'm going to show you how its done in the best of families.

We'll put you in a spin first, and take you out with the help of the Lord.

Now here is where you'll need a lot of luck, and the tighter the spin the more luck you'll need. A Spin is the invention of the Devil, and the results of these are Bigger and Better Undertaking Parlors. That's the reason the Spin is often called the Undertaker's Fox Trot.

A man who gets out of a spinning ship, and lives to tell about it, has something to use as a subject in conversation for the rest of his life. He would be almost as hard to get along with as the woman who went through her "first operation." If a woman ever gets out of a spinning ship, well—the author hopes—yea, he prays on his bended knees—that he'll never meet one. Death would be sweeter.

Now, in the language of a Colored Gentleman that I know, "the mainest thing" is to be sure your 'chute pack is not going to get tangled up in the ship when you start to walk home to Mama.

Bigger and Better men than you have made the mistake of getting out of the ship and finding themselves hung up by their 'chute pack. This is a much more embarrassing position to be in than to have the "ball and chain" find you out with some other woman, and if you're going to be a successful Pee-lot, you'll have to keep out of embarrassing positions—at least as far as a 'chute pack is concerned.

Now the best way to get out of a spinning ship is to work up the side with the spin until your head and shoulders are over the side of the fuselage. This little stunt is not as easy as it sounds. I seem to hear a smirk on somebody's face. I shall elucidate more fully. (That word "elucidate" is a dollar and a quarter word. I use it mostly on Sunday.)

It's customary to see that the 'chute clears the cockpit before bailing out.

If your ship is in a lefthand spin, work up the lefthand side of the fuselage. When you have the head and shoulders out, turn over on the stomach—you know—the thing you have to fill up three times a day.

Now, drop down the side of the fuselage and see that your 'chute pack is on that part of the anatomy that commonly gets spanked. The author hopes you have no lead in this part of the body.

Let yourself slide out of the fuselage until your pack slides down your back, free of the ship. Put both your feet on the opposite side of the cockpit, and push yourself free with everything you have.

When I say "push" I mean just that, and plenty of it, because the further you push yourself the better chance you have of getting free of the tail assembly.

Don't make the fatal mistake of treating the tail assembly of a spinning ship with contempt. When Bigger and Better smacks are given, tail assemblies will give them. A rap from a cowcatcher on a fast moving Express Locomotive is a Butterfly kiss in comparison to a smack from a spinning tail assembly.

No other part of the ship will bother you when you're getting out in a spin. That is, it won't bother you at first, but sometimes the wings seem to take several smacks at you in the dive.

NOW, regarding the "pull." From here on you'll have to use your own judgment, and the author hopes you have lots of that little thing. The exact time for the "pull" to take place depends on circumstances. If you are lucky and "push" yourself with and away from the spin, that is, if you are thrown far enough to clear the ship, then, *right now*, if not sooner, is the time to throw away the "ring."

If you don't push hard enough and you are mixed up with the ship, and you are both running a "tie" race, well—say, what kind of flowers do you like? If this little event takes place, your wife has a good chance of wearing black.

If you "pull," you have all the chance in the world of having the spinning ship do one of two things—cut the Devil out of your shrouds, or tangle up in your bag. Either one of these things will put you in the "doesn't he look natural" class. Now you can see why the accent was placed on the word "*push*." They should write that word on every 'chute pack in the country.

Now, getting out of a ship in anything else than a spin, is what is commonly called a cinch, although you use the same motions as far as getting the 'chute pack out of the cockpit is concerned.

Now, for the next Episode.

We'll say that you are running out of gas in a nice black, juicy fog. This also happens in the best of families. In this case you back out of the ship, holding the stick with one hand, until you are ready to let go of everything.

You poke one leg over the side, then lay on the top of the fuselage, and poke out the other leg. This is where they got the title for that song, "Walkin' My Baby Back Home."

When this is finally accomplished, your leaden extremities will be about fifteen degrees above the Brain Pan, but with your hand still on the stick. One little thing I forgot to mention. Get out of the ship on the righthand side, because the Power Torque of the motor will pull the ship to the left, and if you attempt to get out on that side, the ship might "follow up."

When you are in the position described above, pull back on the stick and let go of everything, pushing yourself away from the ship backwards. In this way you can watch the ship, and when you are free, *pull, boy, pull*, and may the Devil be looking the other way.

If you have to get out with a "conked" motor over a hilly country, the formula is the same, except one thing. Push the stick forward, just enough to keep it in a good gliding angle. The only thing you'll miss will be the Power Torque of the motor, and this is something you can get along without very nicely.

The whole sum total of getting out of

(*Continued on page* 49)

Giant Flying Boat for Navy

THE first of nine huge twin engined Martin flying boats, the largest craft of their kind in the United States, left Washington recently where they have been undergoing tests at the Naval Air Station, to join the fleet in Cuba.

The planes are intended for use as patrol boats and carry a crew of five and powerful radio apparatus. The hulls are made of metal, which would permit them to operate in heavy seas.

Here we see one of the big boats ready for launching on its long journey.

The Cost of Flying a Sport Plane

FIGURES compiled by the Arrow Aircraft & Motors Corporation over a period of one year on the operating costs of five Arrow Sport Trainers, powered by 65 hp. LeBlond motors, show that the average cost per mile is 5.7 cents. This cost estimate was based on 50 hours flying time per month and was figured on the following hourly basis:

Gasoline—4½ gal. per hour @ 22c	$0.99
Oil—2½ gal. in 25 hours @ 85c.	.08
Maintenance and ordinary repairs	.30
Major overhaul—$150 in 300 hours	.50
Depreciation—33 1/3% on $2,700 less estimated salvage of $400.	1.23
Taxes—2%	.09
Insurance—fire, all causes, windstorm, public liability and property damage	1.00
Contingent items—10%	.45
Hangar—$10 per Mo.	.20
Total direct operating cost	$4.84

The Arrow Sport Trainer has a cruising speed of 86 miles per hour at 1,800 r.p.m. Thus the mileage cost computed from the hourly basis is 5.7c per mile.

Altitude Reduces Engine Power

TESTS recently made at the Bureau of Standards in Washington revealed that an aircraft motor which was developing 410 horsepower on the ground developed only 100 horsepower at an altitude of 25,000 feet.

Model Glider Makes 2-Hour Flight

GEORGE SMITH, of Long Beach, Cal., sent us this photograph and the following letter:

"This is an eight and one-half foot glider I designed and built. It flew by towing it up by a string and releasing it. This glider is of a training type and its weight is thirteen ounces.

"Armistice day when I took the glider out and up with about four blocks of string it climbed quickly. I released it then and it turned with the wind going about one hundred feet and then against the wind and kept turning and climbing until I lost sight of it.

"Three days later a man phoned saying he had my glider in one piece. I had released the glider at two o'clock and it had made a perfect landing at three minutes after three. It flew about fourteen miles in 1 hr. 3 mins.

"I thought that was just luck so I took it out again one Saturday. This time it climbed more rapidly. A Navy flyer happened to be flying around and saw the glider and started chasing it. Finally he left it and I went to the airport and waited until he came in.

Here is an unfinished sister ship of the record breaking glider.

"I asked him if he saw the glider land but he said it was at 2000 feet when he left it and it was gaining rapidly. I did not hear anything about the glider until a week later.

"During the week it was very stormy and windy. Finally a man called and said he had the glider. He said it was 'wrecked a little.' When I saw the glider, it was a wash-out. It had lit in a fifty-foot elm tree and was blown out by the rain. But it had flown from Long Beach to Norwalk in two hours.

The Runaway Seaplane

by Francisco Jose

THE motor of the flying mail boat wasn't going so good, in fact, it was missing badly, so Paul Kaniut slipped down for a landing on the more or less placid waters of Lake Minnetonka, near Minneapolis.

While the water slapped the sides, Kaniut climbed out on the pontoons to check up. Being a flier was all right but being a mechanic too, was an absolute requirement in this instance. To be a fish as well wasn't in the contract, but it followed nevertheless.

Shinning about over the pontoon while holding on to struts, wires and such catch-as-catch-can holds wasn't easy, but he gave the motor as good a once-over as possible.

Standing on one of the pontoons he turned the propeller over to crank the motor. Tricky balancing act. The motor started and everything seemed okay. The trouble had been eliminated. With the motor throttled down, the plane slipped over the surface, not fast, but there was headway.

Then Kaniut started his acrobatic walk along the pontoon to the spot where he could hoist himself up to the cockpit. But there must have been some grease or oil lying in wait for his teetering footsteps, for he slipped on a bit of lubricity, and, splash! into Lake Minnetonka.

Down went Kaniut, and down. He came up very slowly, for his clothes were heavy enough to start with and they grew heavier every minute to the point of saturation. As for the shore line, that was non-extinct, as far as reaching it was concerned. The lake might as well have been the Atlantic.

Paddling about and trying to decide what to do Paul started cussing his luck. The things that he said would have warmed the coldest motor on a winter morning. He looked at the dim and distant shores, and decided that they were out of the question. He looked for a boat and saw none.

He looked, with water in his eyes, at his plane for purposes of further forceable comment, and then he raised his hand to look again. It was turning. Yes, it was making a great circle.

Kaniut remembered then, that he had left the rudder hard right when he landed, and when the motor was started it remained that way a little, so it was bringing his ship back to him. Anyway, if not to him, then in his vicinity.

Making a hasty calculation as to about where the self-propelling seaplane would come along, Kaniut started swimming to meet it. Seemed easy, but it didn't prove so easy, not with a couple of hundred pounds of wet—thoroughly wet—clothes to impede rapid mobility.

The plane slipped by, just out of reach. Try as he could he missed it. The motor was too darned good and

(*Continued on page* 53)

XUM

Frank Hawks—the Record Breaker

An intimate biographical sketch of the man who by his spectacular record flights, has made his name a household word throughout the country.

by WALTER RALEIGH

"DO I like to fly? Sure, if I can fly fast.

"I certainly don't enjoy monkeyshines in the air. I think flights over oceans in land planes are as foolish as a transcontinental flight over the Rockies and plains and Alleghanies would be in a flying boat.

"What I like is fast cross-country flying."

That's the opinion of Frank Monroe Hawks who in the last year has made six transcontinental records and who has crossed the 2,500 miles of country faster than any other human in the world's history.

"What's the use," he says, "of loafing along at one hundred miles an hour? That's tiresome. It is worse than that. It is silly and foolish. Aviation to be worth anything must be fast. You can't see the earth go by at one hundred miles an hour. I want to see the country slip past."

While Hawks is the speed burner of the ozone, he is also an aviator with plenty of experience in other kinds of flying. As with many famous and less well known characters he learned to manipulate a plane by learning the machine end.

As a boy of eighteen he hung about the battered old wreck that a pioneer of the barnstorming days manipulated in Long Beach, California, taking passengers aloft for a few fleeting minutes at a price of fifteen to twenty-five dollars a flight. Young Hawks didn't have any money to go up as a passenger, and it was probably just as well.

The typical "haywire" outfit operated by this pioneer airman by the name of Christopherson was an old "pusher." It was patched and re-patched. The pilot sat on the leading edge of the lower wing, his feet resting on nothing at all. In back of him was his engine. About him were his controls that had to be operated by his hands, feet and body. Alongside of him was a tiny seat just large enough to hold a passenger if the passenger wasn't too big.

That was in 1916. But in 1916 they were standing in line for a chance to see the country looking down. Young Hawks stood in line too. Every day for several days he was in the line, but he never got in the plane, for he simply didn't have the price.

One night he had a brilliant idea of how to get a ride with Christopherson. He thought it out as he lay in bed wishing that he could flirt with the clouds and the birds. The idea was all right except that it was based on a falsehood, but the driving desire to fly overlooked that item.

Frank Monroe Hawks

The next morning bright and early young Hawks appeared at the rutty flying field on the outskirts of Long Beach. He was there before Christopherson. When the barnstormer appeared Hawks went boldly up to him:

"I have no money," he began, "but I certainly want an airplane ride."

"Yea," replied the pioneer of the skies, the statement of the young man not being at all new in that day or this day either for that matter.

"I want to make a trade with you," Hawks continued as he screwed up his courage. "It's this: If I write a story about a flight in your plane for my paper you will get more business and I will have the ride."

It sounded all right to Christopherson. "All right," he accepted, "I'll take you up."

THAT was Hawks' first airplane ride. It didn't last but a few minutes; just off the ground, up a ways, and down again. It was mostly filled with vibration and engine roar and hanging on, but it was aviation. However, it was enough for Hawks. He was sold on flying.

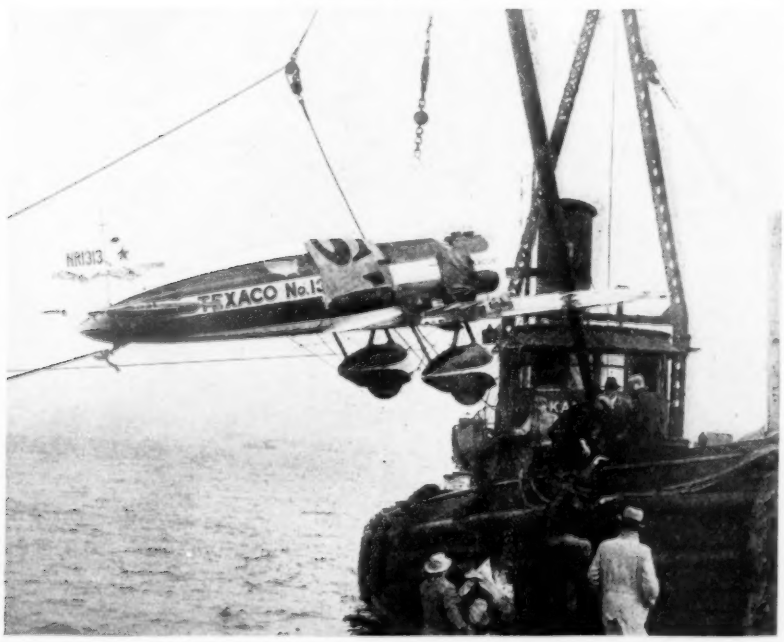
Then his conscience began troubling him. He was no reporter and he wasn't writing stories for papers. He had paid for his ride with a document that might be termed a false pretense.

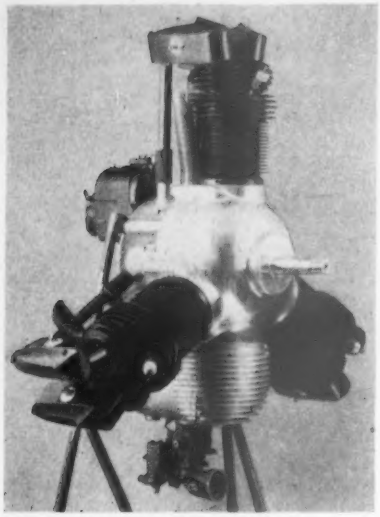
"It bothered me and worried me a lot, the more I thought of it," he said. "Christopherson had played fair and I hadn't. I decided to try and square myself, so I went down the next morning and told him that I had cheated him. He was very decent.

"I told him that as long as I could not pay for the ride with either cash or publicity, I would be willing to work it

(*Continued on page* 57)

Here is the famous "Texaco 13" being loaded on board ship for Europe where Hawks is now setting new speed records.





The Poyer Lightplane Engine

THE Poyer 3-40 is a three cylinder, four cycle, aircooled motor developing 45 H. P. at 2500 r.p.m. The most unusual feature of the 3-40 is that all moving parts are directly driven by the crankshaft. It has no freak characteristics and is so simple that any high-school boy can service it. The crankshaft is mounted on five ball bearings with a double row thrust bearing. The crankshaft is hollow and pressure oiling to all bearing surfaces.

The connecting rod assembly is symmetrical and consists of three rods of equal length, equal weight and each operating about the center of the crank pin, giving equal piston travel and correct timing to both valves and ignition. They are non-adjustable, interchangeable and very simple to service.

The compression ratio is adjustable, the cylinders are screwed into the crank case clamped with clamp bolts and locked into position with a lock ring and can be adjusted to burn either standard or ethyl gasoline in a very few minutes. By slight alterations in the push rods, it can be adjusted to use super fuel for racing purposes.

The valves are seated in bronze seats and fitted with bronze guides. Double valve springs are used as extra precaution. The valves may be ground and seated from the end of the barrel. The valve rocker arms and push rods are enclosed for added protection.

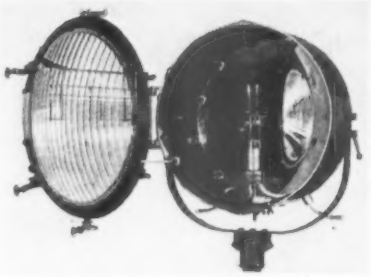
The valves are operated by a planetary valve mechanism installed on the crankshaft and supported by ball bearings which operate the valve lifters by an integral roller and gear traveling across the valve lifter in such a manner as to eliminate friction entirely from the cams.

Ample lubrication is assured by a standard gear pump driver directly off the crankshaft. The oil is drawn into the oil pump through an oil passage which is cored integral with the crank case and delivered directly into the crankshaft eliminating all pressure lines, with the exception of the pressure gauge lines. The oil pump is accessible at all times, being mounted on the outside rear.

Dual ignition is optional.

The engine has a bore of 3⅞ ins. and a stroke of 4 ins., giving a piston displacement of 142 cubic ins. Its weight dry, including oil tank and accessories, is 125 lbs.

New Floodlight Will Not Blind Pilots



THE Westinghouse Electric and Manufacturing Company has developed a new airport floodlight which is known as the type ACB-25.

The vital parts of the floodlight are enclosed in large housings of silicon-aluminum alloy of the same pattern as required by the Aeronautics Branch of the Department of Commerce for rotating searchlight beacons to mark the airways throughout the United States.

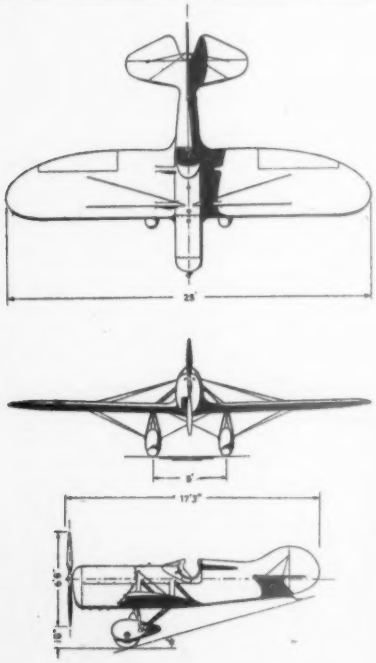
Inside the housing is a silvered glass reflector 25 inches in diameter and made of a special glass which has been accurately ground and polished. This, together with a 3000 watt, 32volt lamp especially designed for the service produces a beam of more than 10,000,000 candlepower.

The entire front of the housing is covered with a glass lens in the form of prisms which bend the light so that the beam takes the shape of a fan. This surprising effect is interesting to observe for it can be plainly seen from the bright path of the beam through the air that vertically there is almost no spreading of the light rays, so in effect a sheet of light is thrown to great distances over the landing areas.

Pilots find great advantage in having the light distributed in this manner for the thin sheet of light indicates the ground level in addition to illuminating the landing surface.

Sheets of stainless steel mounted in the form of a louvre just back of the front lens prevent light from going in upward directions. The effect is a sharp top cut-off of the beam and this makes it possible for the pilot to set his ship on the ground without having his eyes enter the sheet of bright light.

Scale Drawings of the Gee Bee Sportster



LAST month we pictured and described the 1931 Gee Bee Sportster, Warner powered.

Here are the scale drawings and a photograph of the same plane when powered with the 125 h. p. Menasco engine.

The Gee Bee has attained wide favor among sportsmen pilots because of its speed and maneuverability. The first model, introduced last summer, took second place in the American Cirrus Derby.

Dirigible Hunting Does Not Pay

BOB HOLLOWAY, of Plant City, Fla., who recently was accused of firing a gun at a Goodyear dirigible as the ship was flying over a swamp in the eastern part of the county, will go on trial soon in criminal court, facing charges of attempted manslaughter, destroying the property of another person, and improperly exhibiting a deadly weapon.

The blimp, returning to its base at St. Petersburg, Fla., after visiting a festival at Winter Haven, was damaged to such an extent that it was dismantled and shipped back to Akron for repairs. The damages, and loss of helium gas from the gas bags, amounting to about $4,000 was reported by the Goodyear company.

Single Motors Are Safe

THE idea that a plane with three motors is safer than the airplane with one engine is not entirely true, if we can believe Anthony G. Fokker, famous plane designer.

"I build both types," said Mr. Fokker, "and know that one is just as safe to fly in as the other. The secret is in the making and caring of the airplane. I don't hesitate recommending the single-motored airplane as quick as I would a three-engined airplane."

The Travel Air Sportsman

THE Travel Air Sportsman is a three-place, open cockpit, biplane powered with the 185 horsepower Curtiss Challenger engine. The Sportsman is priced at $4,995 flyaway factory. The rugged construction of the Sportsman allows for very rough handling.

Visibility from both cockpits is excellent, and the wide windshields provide adequate protection from the wind. The deep staggering of the wing panels greatly improves forward visibility, the pilot has a clear view of the ground to within three feet of the wheels.

Rate of climb, 750 ft. per min.; landing speed, 43 m.p.h.; high speed, 120 m.p.h.; cruising speed, 105 m.p.h.; cruising range, 600 miles.

Length, 22 ft. 4 in.; height, 9 ft. 7 in.; span, 36 ft.; gas capacity, 65 gallons; oil capacity, 5 gallons; weight of pilot and passengers, 510 lbs.; weight of fuel and oil, 457 lbs.; total useful load, 1,031 lbs.; total gross weight, 2,600 lbs.

George Washington Was Air-Minded

An interesting account of the first balloon ascension in the United States

PREPARATIONS now under way in the United States and abroad for the George Washington Bicentennial Celebration will remind everybody interested in aviation that the Father of his Country had the vision to perceive the importance of ballooning and the tremendous possibilities of the business when it was in its infancy.

As the first President of the republic, he gave his official sanction to the first successful passenger-carrying flight on this side of the Atlantic Ocean and was so enthusiastic over it that he, with his entire cabinet, witnessed the event.

In the spring of 1793, when the seat of national government was at Philadelphia, the French aeronaut, Monsieur Jean Pierre Blanchard, notified Mr. Washington that he proposed to ascend in a balloon from the old prison court of the city. Assured of the President's approval, Blanchard covered the town with hand bills announcing his flight.

Immediately the populace was divided into two camps, one asserting that the adventure would be a success, the other characterizing it as a foolhardy undertaking and expressing astonishment that Mr. Washington would countenance such a reckless project.

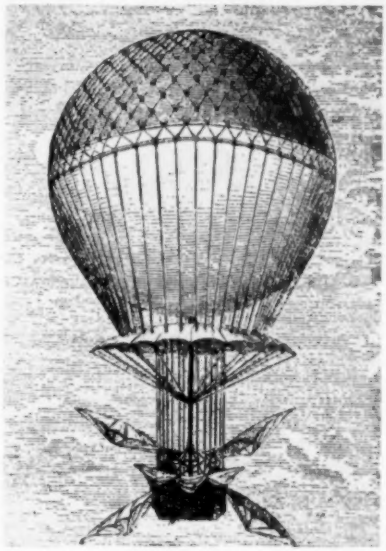
Those who favored the Frenchman pointed out that successful balloon flights had been made in France as early as 1783, and that this same Monsieur Blanchard, travelling with a companion, had crossed the English Channel in the same craft which he was to pilot from Philadelphia.

The adverse critics replied, with equal truth, that one Jean Francois Pilatre de Rozier had been dashed to death in his attempt to duplicate the channel feat; and that Blanchard himself, before completing his crossing, had been compelled not only to throw out all his baggage and equipment but also to discard most of his clothing in order to keep his craft in the air long enough for it to reach the British shore.

But the Blanchard fans had still another shot in their locker. The year before, two Philadelphians, inspired by the flights accomplished in France, had put together forty-seven small hydrogen gas balloons and attached them to a basket, proclaiming that the ship thus constructed was ready to rise into the empyrean.

Unfortunately, they were confronted by one difficulty. Confident as they were of the skyworthiness of their craft, neither one of them had the courage to trust his life to its performance. But where there's a will there's a way. Backing a thick-witted carpenter named James Wilcox into a corner, they talked him deaf, dumb and blind, assailing him with so much persuasive eloquence that in the end the bewildered artisan agreed to ride the balloon, no matter where it went.

Up it rose with the carpenter in the basket. Disastrously for science,



An early print of Blanchard's balloon in flight.

however, the wind was toward the river; and when Mr. Wilcox, taking a shuddering peep over the edge of the basket, saw that he was about to be transported above the water, he suddenly remembered that he had brought along with him an axe, knife, saw, chisel or some other cutting instrument with which he might deliver himself from his terrorizing predicament.

Reaching for his trusty tool, he without more ado began an assault upon the forty-seven gas bags. So truly did he thrust and so devastatingly did he stab that balloon after ballon crumpled into nothingness with a thin and sickly hiss, whereupon the basket sank precipitately to dry land, and Mr. Wilcox stepped tremblingly forth to receive the bawling out of his life from the irate inventors.

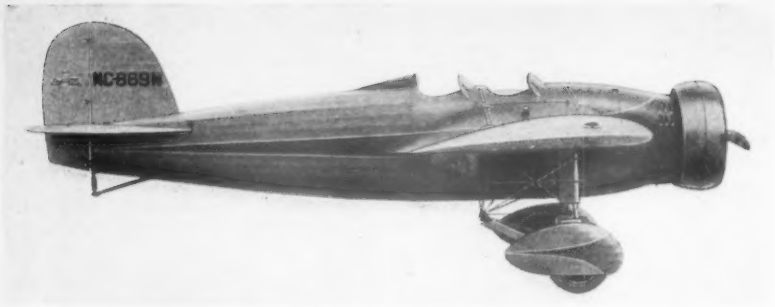
Surely, argued the Blanchard enthusiasts, since that had happened, an experienced and intrepid aeronaut like Monsier Blanchard could navigate the air with sang froid, not to say dignity, skill and triumph.

Came the great day. Its dawning was ushered in by the firing of cannon. At short intervals from then until ten o'clock in the morning, the hour set for the ascent, the big guns boomed and thundered.

During the past few days couriers had informed the country people of the impending event; and long before the appointed hour the prison court and all adjacent streets were packed with a multitude, while women hung out of every window commanding a view of the scene, and men and boys climbed trees and stood on roofs to witness the fate of the visiting Frenchman.

When Mr. Washington, with Alexander Hamilton, Thomas Jefferson, the

(*Continued on page* 56)



The Emsco Midwing Sport Monoplane—America's First Approved Midwing

THE Emsco Aircraft Corp. has just received Approved Type Certificate No. 403 on their Midwing Sport Monoplane. This is the first midwing plane to be licensed by the Department of Commerce.

The plane may be powered with any of three engines—165 h.p. Continental, 160 h.p. Menasco, or 170 h.p. Challenger.

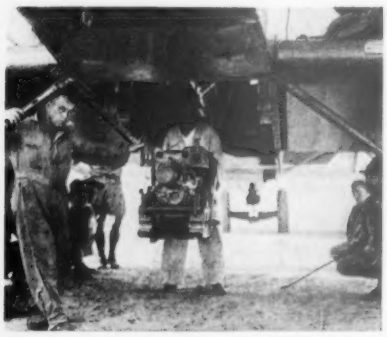
The equipment includes steel propeller, dual controls, Bendix brakes, Aerol shock absorbers, and a machine gun mounting.

Span	36 ft.
Chord	6 ft.
Length	22 ft., 11 in.
Fuel capacity	35 gal.
Oil capacity	5 gal.
Gross weight	2100 lbs.
Useful load	607 lbs.
Weight empty	1,492 lbs.
Pay load	200 lbs.
Top speed	135 m.p.h.
Cruising speed	115 m.p.h.
Landing speed	35 m.p.h.
Climb	1200 ft./min.
Absolute ceiling	20,000 ft.

Transporting a Field Gun by Plane

DURING the recent army maneuvers at Cristobal, in the Panama Canal zone, a three-inch field gun was transported to another position in one hour and seven minutes over territory that would otherwise have required four days.

This unusual feat was made possible by carrying the gun carriage in the cabin of an army bomber, while the gun itself was lifted by a special sling into the bomb bay of the plane.



Here we see the ground crew getting the gun into position under the giant plane's fuselage.

Navy to Use Amphibians

A CONSIDERABLE portion of the U. S. Navy's aircraft will be capable of landing on the surface of the ocean, the decks of vessels or land in the near future. Amphibious landing gear will be installed on the planes, including wheels, pontoons and brakes.

Ingenious Drift Indicator Secretly Tested

ANNOUNCEMENT of a new drift indicator, secretly tested by Captain Frank M. Hawks, was made recently by the Pioneer Instrument Company.

Mounted on the floor of Hawks' Texaco 13, the drift indicator has helped guide the famous speed pilot on the last several thousand miles of his cross-country jaunts, and will remain on the plane for his tour of Europe.

The drift indicator is an auxiliary to the compass, and enables a pilot to overcome the drift created by cross winds and to keep his plane on a straight course. The instrument is of simple construction and is installed in the bottom of the cockpit where it may be read with little or no effort by the airman.

The indicator has a top which is essentially a ground glass screen, 3½ inches in diameter, with a lens inserted in the bottom of its funnel-shaped case. As the ship moves through the air, the ground below is reflected in the ground glass screen.

Ground objects appear to travel across the screen in the direction of the moving airplane, and by rotating the screen until the objects travel parallel with sight wires, the pilot can read his drift angle from the scale on the instrument.

He then is able to correct his compass course by adding or subtracting the degrees of the ship's drift.

The instrument enables the pilot to make a quick observation to obtain the drift angle of his plane without peering over the cockpit or opening a cabin window.

Buhl to Build Autogiros

ON MARCH 19, the Buhl Aircraft Company of Detroit, became an Autogiro licensee.

John J. O'Brien, managing director of the Buhl Aircraft Company, said that a "nation-wide clamor for the Autogiro" had been revealed through the medium of a questionnaire which his concern recently sent to 50,000 representative persons in this country. It was through the instrumentality of the public faith in the Autogiro thus revealed, and their own confidence in the future of the principle, that his company's decision to take the Autogiro license was crystallized.

The *Detroit News* which now operates its own Autogiro to transport news men, photographers and press matter to and from places otherwise inaccessible by air, commented on the announcement as follows:

"There is more than mere local significance in the announcement . . . that the Buhl Aircraft Co. has purchased manufacturing rights, and soon will begin construction of the new type of airplane using the Autogiro principle.

"In its larger implications it foretells a marked progress in aviation, since it is recognized that the next advance in the use of airplanes must come through the insurance of that element of safety which the Autogiro has achieved."

Glider Meets With Odd Accident

The remains of the glider after coming through the breakers.

HANG your glider on a hickory limb but don't go near the water!

That is the advice given out by Vic Evans of California. He was soaring in an all steel secondary glider over the cliffs at Redondo, Calif., when the wind died down.

His only landing fields were a grove of young hickory trees, or the ocean. From the air the sea looked a little the better—as there might be a chance of finding a place on the beach that was not covered with rocks or people. So he turned his glider out to sea.

The only smooth places on the beach were covered with people bathing. Afraid of hitting one of them, he sat down in the ocean. The glider floated for some time, while the pilot took off his clothes and swam ashore.

The glider soon floated in and was literally washed out while coming through the breakers.

XUM

The Women Answer Capt. Purcell!

When Capt. Purcell undertook to slam the women pilots, he started a free-for-all fight. Now the women tear into Purcell and the battle is on.

Dear Editor:

Wow! I'm coming up for air!

Since that last article, I've heard from every man, woman and child I ever knew.

They have phoned me, wired me and written me. Every time the doorbell rings, I jump.

But the funny part of it is that eight out of ten agree with me.

Very truly yours,
Capt. Chas. W. Purcell.

SO SAYS the Captain in regard to his article, "What I Think about Women!" which was published in the April issue of POPULAR AVIATION.

On the other hand, we in the editorial offices have been in touch mostly with the "two out of ten" that do not share the Captain's enthusiastic distaste for the fair sex.

Letters, letters and more letters—they've been piling up for over a month, and if the Captain only knew what *some* women think about him, he would beat a hasty retreat to parts unknown.

Leland Silsby of Ashland, Ohio, just about sized up the situation when he wrote:

"I bet that Cap Purcell had better oil his guns. The girls are silent about his article in the April issue, and when a woman is quiet—double your guard!"

So if the Captain now has his guard doubled, we'll let loose a high explosive barrage of words from the women (and some of the men) on the subject of "Women Pilots," as well as some interesting sidelights on "What I Think about Captain Purcell."

THELMA LA RIVIERE, of Oakland, Cal., heads the list with the following letter:

"I have just finished reading Captain Purcell's impressive thoughts of women—in fact, I read the article twice in case I missed some of the compliments the first time.

"One of the first things I heard at a local airport where I have had a number of hours, was that all women were dumb and not expected to learn anything anyway. After listening to the instructor tell a girl fellow-student what to do and how to do it, and watching the expression on her face, I wasn't at all surprised when they spent only a very few minutes in the air. But from the muttered comments, threats, and insinuations I overheard later, I gathered that *some* women must be dumber than the rest!

"I hope you will advise Captain Purcell that I agree with him that *some* women are dumb—there are always exceptions, as it would hardly be fair to the men to have all of us smart and capable—which reminds me, did you ever watch some of these so-called bright *men* automobile drivers on a crowded highway? And still men claim that women are dumb!"

There, that ought to give the Captain a little encouragement. But stick around—that's only a starter.

Here's an interesting letter from Raleigh, N. C.:

"I have just finished reading Capt. Charles Purcell's article about women fliers and think if that's the best he can do, he had better stop writing.

"Women *will* fly 'big time stuff' and when they do the passengers won't 'take-off' through the windows; they'll be glad to go with them.

"If Capt. Purcell *thinks* all this about women fliers, he could at least keep his thoughts out of magazines.

"I read POPULAR AVIATION every month and enjoy it very much, but if men like Purcell write such things about women I'll discontinue reading it.

"Yours for more and better women fliers.

"Katharine Stinson."

Now, if this is *the* Katharine Stinson of the famous flying family, you want to sit up and take notice because this young lady was flying when most of the present day pilots were still kicking the slats out of their cradles.

HERE'S the sad case of a young chap in Milwaukee. We can't give you his name, but just read what he says:

"Capt. Purcell must be a pretty brave man, for it takes a man with a lot of guts (or liquor) to tell the women just what he thinks of them.

"I think Capt. Purcell is right when he says that women are so dumb they are dumber. Just watch them and see. I've married two of them and found them to be that way. Maybe that is why I got such a kick out of Capt. Purcell's article.

Who was it said, "Live and Learn"?

Well, anyway, the next feature on the program is an article by M. E. Wenrich of Philadelphia. "M. E." does not give much of a hint as to whether we're dealing with a man, woman or child, but draw your own conclusions:

"HE IS a little chimney, and heated hot in a moment!"

Thus spoke a maiden of long ago concerning one Captain Miles Standish, who proceeded to hit the ceiling when he realized that he could jump in the ocean as far as the lady in question was concerned.

The Captain, boiling over with wrath and steaming like a tin Lizzie on a steep grade, set out to bite the ears off the neighboring Indians. Nevertheless, he cooled down and lived, possibly, to "love another day."

The quotation above is what entered my mind as I read the article, "What I Think about Women."

Your caption reads, "A Rip-snorting Opinion . . ." Yeah! Mostly snorting!

Captain Purcell's article would be amusing if it were not so pitiably infantile. It condemns itself by its own absurdity. The majority of your readers are men. They like facts. Captain Purcell deals in generalities—makes assertions.

Any nit-wit can read between the lines of this acrimonious assault and see for himself that it is not aviation that has engendered in this puerile mind the opinion of women which he so hotly spouts. The article should be entitled: "What I Think of Woman—If, When, How and Why."

Women of the type of Amelia Ear-

In Japan, the women fly "big time stuff." Here are several of the pilots who hop passengers on the regular run between Tokyo and Shimizu.

hart Putnam have traveled from place to place telling women that they are not taking sufficient interest in this still new and intriguing industry, doing their best to arouse enthusiasm among those of their sex for aviation; and then along comes a nincompoop captain of horse marines and tells the cock-eyed world that women are so dumb that they would make a row of totem poles look like Einstein.

The reason women haven't reached the front page in this much flaunted "big stuff" is that there has been discrimination against their sex. How does Captain Purcell arrive at his conclusion that women can't handle trimotor ships when they have not been tried?

The World War proved that, given a chance, women do measure up. The spirit of Moll Pitcher didn't die when the American Revolution ended. If the eminent Captain stepped into the munition factories during the World War (if, indeed, he had emerged from his crib at that time) he must have seen women standing in the grime and grease of the smelly machine shop, taking man's place. (I am proud to number among my friends women who did this very thing.)

In case he can't recall the history of that war, the Red Cross, the Y. M. C. A., the Salvation Army and even the war correspondents were not all men. And the women weren't all back of the lines entertaining the superior officers.

I say that in cases of emergency woman has stepped into man's breach —albeit not into his breeches. I believe that she can do the same with aviation.

As to preference in pilots, I should just as soon ride with a sensible woman (for there are some, the Captain's sputterings to the contrary notwithstanding) as to attempt flight with a man so encrusted with egotism that he can't distinguish that portion of his anatomy just north of his neck from a piece of ivory of like dimensions.

Take the insurance question. I was recently signed up for some new insurance, and this is the question I was asked:

"Are you interested in aviation *or any other of those tom-fool sports?*"

I wanted to blow up and say aviation is not tom-fool, but I wanted the insurance more. My policy reads thus: "The Double Death benefit will not be payable if the insured's death resulted from . . . engaging as a passenger or otherwise in aeronautic or submarine operations or in service connected with either."

Take notice: it does not refer to the manner of piloting. It means aviation as is. Insurance companies do not like aviation. They do not want their proteges to risk their lives in one of "them things," regardless of the size of the "job" or the identity of the "skipper."

Thus writes M. E. Wenrich.

Take *that* and *that*, Captain Purcell, and if you haven't had enough, hang on and get some more body blows.

Now we have Miss Caroline M. Moran of Groton, N. Y.—more sinned against than sinning—being young in the ways of aviation, but enthusiastic in spite of the disillusionment caused by the Captain's article.

Miss Moran writes:

"Goodness! What woman ever offended the Captain like that?

"It must have been pretty bad for him to be so bitter. I'll bet he is not married or he would get a "rolling pin" over his head if his wife saw his article. Putting crepe on many a young girl's hope and dream.

"The article, I must say, was in some ways true, but ALL women are not alike any more than all men are alike. Some succeed, some do not.

"So, in behalf of my sex, I must say I don't think Captain Purcell was quite fair to us women as a whole.

"I think if he would allow himself to think back he would remember a lot of men who were not so wonderful as pilots either. Not ALL men can fly a transport ship, nor can they do lots of things, but *some* men can and so could *some* women if given a fair chance to prove it."

As the parting shot in this "battle of the sexes" we have an article by Miss V. Leora Blaisdell of Kalamazoo. She is a stunt and racing pilot and flew the Postum company's entry in the second annual Michigan air tour.

Furthermore, she says what she wants to say without stuttering, as is evidenced by the following article:

"WILL women ever fly commercial runs?"

"*They will not,*" says one prejudiced Pain-in-the-Pants, alias Captain Charles W. Purcell, who came crashing into print in the April number of this interesting magazine with his "rip-snorting opinion of women's place in aviation."

By the way, does anyone know who this poor Pain-in-the-Pants is, whom we may as well call P.P. for short? To justify his subtle turgidity his name should, at *least*, appear on the official List of World and American Records.

As concentratedly as a *woman* could, I looked through this list (corrected to March 1, 1931), but I did not find it. However, the list is a long one, and since "the woman was never born who could concentrate on any one thing for any length of time," perhaps my mental strength gave out. Undoubtedly his name is there—in some obscure place.

One gathers, as he peruses P.P.'s article, that he not only has a perceptible quality of bombast, but that he has a number of opinions about women, not strictly pertaining to their ability to hop "big time stuff" that he wants to snort about.

There creeps into my feeble brain a suspicion that some one of our sex found him out for what he was and walked out on him, and that he is

(*Continued on page* 53)

Amateurs Build Flying Boat

OUT in the wilds of Long Island there are two courageous lads whose names we have promised not to reveal and whose pictures were obtained only with great difficulty. The reason for all of this mystery is that they are building an "H" boat out of material salvaged from the junkyards and airports and they fear that if their identity was revealed, the Department of Commerce would not grant them a license.

Neither of these chaps has ever flown, yet in the year which they have taken to build this ship, each has learned enough about aerodynamics and the theory of flight to feel confident that he will be able to solo the ship. What is more, each one wants to.

One of the most remarkable parts of their exploit is the workshop in which they have turned out this flying boat. The workshop is so small that there is barely headroom in it (see shack in

A view of the uncompleted plane made from junk parts.

picture) yet they have turned out a flying boat hull of splendid workmanship.

Wings were replevined from old army planes and the rest of the materials came from odds and ends at various commercial airports.

Air Transport Proves Reliable

STATISTICS which have just reached this country of the operation of air-liners during 1930 on the routes of Australian National Airways provide most impressive evidence of the degree of regularity that may be expected of modern air transport.

In the whole year only two flights were not completed out of 1,164 scheduled, the percentage of regularity thus being 99.82. The two uncompleted flights failed because of adverse weather; there was no instance of failure caused by mechanical breakdown of any kind.

Australian National Airways operate a fleet of Avro three-engined monoplanes, equipped with Armstrong-Siddeley "Lynx" air-cooled radial motors each of which develops about 240 horsepower. Each machine has accommodation for eight passengers.

Strange Freight Travels by Air

REMARKABLE, now, is the variety of air-borne merchandise. Fragile articles in growing numbers are dispatched by aeroplane, not only on account of the speed but also for the reason that air-borne goods receive such care in handling and transport.

An important point, when considering the airway as a means of transit for urgent loads, is that insurance is cheaper by air than by any other transport, owing to the absence of pilfering and the greatly reduced risks of breakage.

Nearly 2,000,000 radio tubes have now been carried in the machines of Imperial Airways between London and the continent. So, also, have approximately $400,000 worth of loud-speakers.

When valuable pictures have to be sent to and fro between London and the continent, it has now become the rule to consign them via the airway. It is increasingly the habit, also, on account of the special handling it receives, to send delicate electrical apparatus by air.

Perishable goods find their way constantly into aerial cargoes. Not long ago, owing to the fact that Brussels sprouts are not normally available in Egypt in winter, some of the big hotels in Alexandria and Cairo conceived the idea of having a consignment sent out specially by the Indian mail-plane to give an extra attraction to the Christmas fare; so, also, on another occasion, were a number of lobsters.

Nearly all the gold and silver bullion dispatched from London to the continent is now air-borne—a convincing tribute not only to the speed, but also to the security, of aerial transport.

Often, too, as a contrast from this, a consignment of day-old chicks will be placed on an early-morning 'plane, and in not more than a day's flying will reach some destination far-distant across the continent.

Strange loads are sometimes air-borne. Not long ago a cargo machine had its interior transformed, temporarily, into a lion's den. In this improvised cage a fully-grown lion, accompanied by its trainer, flew from Paris to London to take part in a circus.

On another occasion a big Handley Page-Napier cargo-plane had its hull fitted up as a horse-box, in order to transport a valuable animal on an urgment aerial journey from abroad.

Free Training Plan

THE Arrow Aircraft & Motors Corporation has put into effect a new policy whereby all students in the Arrow Flying School who purchase Arrow Sport planes will be refunded the money they have spent for dual instruction.

This is in keeping with the company's policy of giving free flying instruction to purchasers of Arrow planes.

New Bird Biplane Has Seats for Four Passengers

THE new 125 h.p. Kinner-Bird, manufactured by the Bird Aircraft Corporation, is a 4-place open biplane. The extra passenger is accommodated in a folding seat in the forward cockpit.

This seat may be quickly removed, transforming the plane into the usual three or two seater. Dual controls may be installed in ten minutes and the excellent visibility makes this plane an ideal trainer.

Standard equipment on this model includes navigation lights, air wheels and brakes, Aerol struts, dual controls and cockpit covers.

Specifications and performance follow:

Length overall	23 ft.
Height overall	8 ft.
Span, upper wing	34 ft.
Span, lower wing	25 ft.
Weight empty	1,350 lbs.
Disposable load	985 lbs.
Gross weight	2,335 lbs.
Top speed	120 m.p.h.
Cruising speed	100 m.p.h.
Landing speed	35 m.p.h.
Climb sea level	1100 ft. per min.
Service ceiling	17,000 ft.

Mouse Becomes Aerial Stowaway

A NEW hazard to aviation recently was discovered in Raleigh, N. C. A large section of wing fabric pulled loose from his plane while Pilot Oscar Dawson was making a flight. The ship made a wobbly landing, but did not crack up. When the wing was ripped open, Dawson found a mouse huddled in a nest of threads from the fabric.

Seaplane Hunts Bootleggers

A SEAPLANE especially equipped to search out hidden liquor along Florida's devious coast and to spot rum-runners dodging about the keys will be put in commission soon by the customs border patrol.

The plane, a Waco two-seater with a 200-horsepower French Hispano-Suiza motor was brought to Tampa recently to be outfitted.

Sidney C. Brown, collector of customs, reported that the plane was taken from a progressive rum-runner who used to fly high and laugh aloud at the border patrol on the ground.

Brown and his men of the patrol are enthusiastic about the seaplane. It can be used to great advantage in searching the coast and keys for hidden caches of booze; it can be used in searching the land for automobile loadings dumps. It can follow a fleeing liquor automobile, and direct land forces how to corner it, and it can be used to detect all sorts of loading and shipping operations at sea.

Helium to be Used in New German Zeppelin

HYDROGEN cells will be buried in helium as a safety measure in the new Zeppelin being built in Friedrichshaven, Germany, by Dr. Eckener. The hydrogen cells are necessary to give the ship sufficient lifting power, but they will be completely surrounded by the non-explosive helium so danger of a serious explosion will be averted. The Zeppelin, which will be completed next year, is to be equipped with Diesel motors.

Unusual View of Do-X Beached at Low Tide

HERE we see an unusual view of the DO-X at low tide. The huge German flying-boat is shown at Alfelite, Portugal, on the Tagus river, before her recent attempt to fly to America.

Peasants from miles around came to view the giant craft before it left on its ill-fated attempt to span the Atlantic.

Aqua-Gliding—the Newest Sport

Fast—Thrilling—but Safe

W. C. Meloon at the controls; his son, Walter, on the trapeze—

—and the speedy outboard racer that completes the outfit.

by
WALLACE STEVENS

ONE afternoon last November four outboard motor boat stunt men and racing enthusiasts were gathered about a newly assembled Waco glider on the shores of a small lake near Pine Castle, Florida. The glider was equipped with special training pontoons and the quartet gingerly slid it into the water.

Not one of the men had ever flown a plane or a glider. In fact it was the first time they had ever seen a glider. Their knowledge of aviation was largely confined to what they had gained from friendly discussions with pilots. Their experience in the air had been practically limited to brief flights through space when they shot their small boats up inclined runways and over obstacles at high speed doing "stunt stuff."

But they had had a hunch that a glider could be put into the air behind a light racing outboard and that it would offer a new yet comparatively safe thrill to recreation seeking Florida.

W. C. Meloon, business leader of the group in its tours of the outboard racing circuit and who had instigated the purchase of the glider, was the first to try it out.

After a few minutes familiarizing himself with the controls he gave the signal and the fastest outboard shell started out towing the glider behind 150 feet of line.

A fairly heavy breeze was blowing and when the boat swung the ship around into the wind Meloon drew back slightly on the stick. The glider rose with an ease that surprised him.

"I was nervous I will admit," said Mr. Meloon. "The air was bumpy and the ship swung a good bit from side to side. I was partially 'frozen' to the stick, gripping it tightly with my fist and with my elbow dug into my side. But when a wing tipped down I instinctively pulled the stick to the side that I wanted to lean to correct it and righted it to an even keel again. When I came down I dipped a wing into the water and spray shot over me. But no damage was done. And I was happy. I had risen into the air, flown by my own skill and landed safely."

Walter Meloon, son of W. C., and Fred and Bud Jones followed into the air with the same results. Each dipped a wing as they landed but no harm resulted either to themselves or the ship. Then as they were preparing to call it a day Cal Meloon, brother of W. C. and one of the best known outboard stunt men in Florida, came out and asked a trial. He went up and came down with hardly a ripple as the ship settled back on the water.

The five men were thrilled. They caught the vision then of a new sport that would interest Florida's thousands of winter tourists and that would be in demand as a short cut in training for aviation enthusiasts.

Those first flights demonstrated the safety of the glider as long as it was kept over water. In a state dotted with lakes and fringed by wide rivers, bays and protected ocean channels, they felt that they had a perfect training ground blessed with a nearly ideal winter climate. They immediately set to work to perfect themselves in handling the glider and to arrange a tour of the state with their ship and the outboards.

TRAINED in stunt work they naturally turned toward a transfer from a speeding motor boat to a three foot trapeze hung under the glider as the base of their trick stuff. Walter Meloon was the first so far as is known to ever jump from an aquaplane's deck to a glider.

The stunt proved easy in a light steady breeze but in their first public exhibition a gusty wind was blowing and the boy was knocked from the boat several times before putting the trick through. But the crowd apparently enjoyed his tumbles into the water just as well as his final successful effort.

The venture proved a success from the start in spite of an unusually cold and rainy winter for Florida. Crowds thronged out at the principal cities to see the glider and outboard combination. Applicants for instruction in gliding kept the machine busy at all hours.

It was decided at the outset to throw no unnecessary frills into the instruction. It had been found that the glider while being towed was thoroughly under the control of the man running the boat. If the beginner began to show signs of nervousness and danger of not getting the glider back on the water safely the boat was slowed up and the glider squashed down harmlessly.

Under such conditions it was felt that the student flyer was absolutely safe and that the best and quickest way to teach him was to put him in the ship and take off after only a minute or two of ground instruction. When he got the feel of the glider going over the water at a fast speed and gained confidence he could ease back on the stick and take to the air. "The way to learn to fly is to fly" was their principle.

Instruction was sold on a basis of ten minute periods at two dollars per period or ten dollars for a full hour. A number of men students took the ship off and landed it perfectly in the first ten minutes' instruction. A majority bought an hour's instruction and there was hardly a student but who learned to take off, kick the trigger on the tow rope and land perfectly before the hour was over.

More than a hundred students were trained in the first three months that the group toured the state and the worst accident that befell any of them was a ducking.

W. L. Stribling, better known as Young Stribling, nationally recognized contender for the heavyweight championship, was one of the latter victims. Young Stribling is an airplane pilot of several years' experience and when he saw the glider in action over a lake at Orlando, Florida, he wanted to try it.

Shoving off, he rose easily and dropped his tow rope. He glided down into the wind on a pretty slide. But just as he touched the water he forgot that he hadn't any power such as he was accustomed to in his plane and headed around with the wind to taxi back to the landing.

As his momentum died a puff of wind caught under the tail of the ship and nosed it over. Stribling was in street clothes and when he saw what was coming he cussed and shouted for help just like any other human being. But under he went and came out kicking and grinning.

The papers got hold of the incident and news dispatches were sent out making it a serious affair with the big fighter narrowly escaping drowning. But as a matter of fact it was an ordinary ducking and Stribling was ready to go again as soon as he had changed clothes. Since then in Florida glider circles turning with the wind and nosing over at landing is called "doing a Stribling."

INTEREST in gliding over water has not been confined to men nor has it been restricted by age. A number of women have taken up the art and are hearty boosters of the sport. A girl at Lakeland, Florida, reached a 75 foot altitude in her first hour's instruction and handled the plane like a veteran.

"I won't say that women have taken to the sport as readily as men as yet," said Mr. Meloon, "but we have had a number take it up and the athletic type girls of eighteen to twenty have as a rule learned to handle a ship in a very few lessons. After they learn they are highly enthusiastic.

"Among the men students we had one grey haired but athletic student more than seventy years old. I was a little doubtful at first of the wisdom of his trying to fly after having put in his allotted three score and ten years on land, but he insisted. He was a little nervous and dipped a wing as he came down from his first hop, but he kept at it and handles a ship as good as any of our youngsters now.

"One of the few candidates we turned down was a chunky young fellow weighing over three hundred pounds. I was afraid that he might get hurt if he fell into the water. I learned how groundless my fears were a night or two later when I visited a side show and saw the same man dive from a seventy-five foot tower into a little six foot tank of water."

This summer gliding in Florida is expected to reach a high point of interest. The state has considerable summer as well as winter tourist trade and visitors and home folks alike, particularly in the resort sections, spend a good part of the time from June to September in bathing suits. And a bathing suit, a glider and a little racing boat with a powderful outboard motor are expected to form a popular combination. In fact the first warm

(*Continued on page* 54)

Stop and Go Lights Control Airport Traffic

A GLORIFIED set of red and green stop and go lights, such as govern motor cars on a busy boulevard, have been installed to govern the movements of planes at the Washington Hoover Airport in the Capital city.

The lights were designed and built by the staff of the Airport and may be swung so they are visible to pilots arriving from any direction.

Miss Ferebe Westcott, Airport hostess, is photographed with the lights.

Curtiss-Wright Authorizes Models

THE new line of model airplanes shortly to be introduced by the Selley Manufacturing Company, Inc., with the approval and cooperation of the Curtiss-Wright Airplane Company, is expected to establish a new vogue among the model enthusiasts of the country. The models are scale-reduction non-flying models of the more popular Curtiss-Wright ships. They will be sold in complete construction sets and will also be available in built-up form.

The first three models will be the Curtiss Hawk pursuit plane, the Curtiss Condor transport plane, and the Travel Air Mysteryship.

While these models are non-flying, scale reproductions, the plans are accurate enough for an expert model builder to make them into flying models.

Spark Plug Servicing

FEW people realize that a spark plug can be shorted simply by drawing an unbroken line with a lead pencil from the brass terminal at the top of the spark plug down to the steel shoulder—a distance of less than an inch. This fact clearly conveys that spark plugs can be shorted, even when otherwise in good condition.

Any deposit of film or foreign matter on the porcelain will, in time, short the entire plug, or greatly weaken its spark.

Service men in every hangar should be instructed to wipe off the spark plugs of every plane brought in, particularly after it is washed. It takes only a moment's time and is worth the trouble.

School Teacher Writes Aviation Textbook

MRS. LAURA B. HARNEY, a woman school teacher of Mount Vernon, N. Y., has prepared a textbook on aviation, which is soon to be brought out by a Boston firm of textbook publishers.

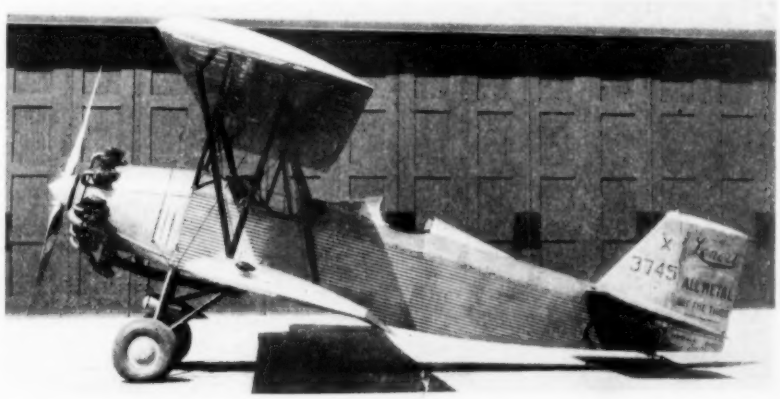
Mrs. Harney is faculty advisor of the Aeronautics Club of Washington Junior High School of Mount Vernon, and is said to be the only flying woman school teacher in the East.

Lenert Biplane Has Unusual Features

THE three-place Lenert model "C" open biplane is announced as being "all metal but the tires." It is the only all metal biplane in production.

The model "C" is powered with a 165 h.p. Continental 70-A engine. Its high speed is 125 m.p.h.; cruising speed, 110 m.p.h.; landing speed, 30 m.p.h., and range, 500 miles.

The Lenert carries an adjustable steel prop and Heywood electric starter as standard equipment. Also, it is fitted with dual controls, adjustable stabilizer, running lights and battery, in addition to the instruments, which include a compass and bank and inclinometer. The Lenert sells for $4,900 complete.



The Lenert is "all metal but the tires."

THE DETROIT SHOW

Who was there—and what they had to offer

by LIEUT. JOHN SAVAGE McHENRY

THE 1931 National Aircraft Show held at Detroit from April 11-19 was unquestionably one of the finest aircraft shows ever held. The first thing which instantly "set it right," so to speak, in the hearts of those interested in aviation was that the show was held at the Detroit City Airport.

Aviation shows in the past have generally been held at some large hall, coliseum or armory, where automobile shows are usually held. The inconvenience of these past shows has been quite a handicap to everyone, since no demonstrations could actually be made, right at the show.

But this year with the show located right in the hangars of the airport, a person has only to step outside and get in the particular planes he is interested in and really see for himself just what their performance is.

Clarence M. Young, assistant Secretary of Commerce for aeronautics, declared after a careful inspection of the exhibits and the general layout of the entire show, "It is the greatest aviation display ever held. . . . The public has never been offered a wider range of airplanes and the industry has never before presented its products more intelligibly."

This factor along with the growing interest in aviation attracted unheard of crowds for the entire week of the show. The second day of the show there were over 20,000 persons that viewed the exhibits, and at least 50,000 more saw the demonstration flights.

The hangar in which most of the exhibits were held is the largest in the world, but even at that it was not big enough to house the large number of airplane and accessory exhibits. A 30,000 square foot circus tent was erected alongside the hangar to take care of the overflow.

There were forty-two aircraft manufacturers exhibiting and demonstrating planes. If each of the three large holding companies—United Aircraft, Detroit Aircraft, and Curtiss Wright—were not counted as just one manufacturer the total number of concerns displaying planes would be well over fifty. The manufacturers had a total of eighty-three planes on exhibit, and an even larger number of planes on the field ready for demonstration purposes.

ONE of the most distinct trends that has developed since the last national aircraft show, and something which is of particular interest to POPULAR AVIATION readers, is the striking increase in small, light, low-priced planes.

On this month's cover we show Bill Stout's new "Sky Car." We have pictured it as it might look coming in for a landing at an airport protected by the traffic control lights described on page 32 of the May issue of Popular Aviation.

Here we see the Sky Car on the apron at the Detroit airport.

Below, Designer Stout explains the features of his design to Lady Heath, women's editor of Popular Aviation.

Last year there were only two of these light planes exhibited. In the present exhibit were 11 makes that fit into that category. These were—the Aeronca, Buhl Bull Pup, Curtiss-Wright Junior, American Eaglet, Rearwin, Heath, Stout Sky Car, Taylor Cub, Cloud Coupe, a trainer by Nicholas Beazley, and the new Alexander Eaglerock coupe.

These flivver planes appear to have gained at the expense of the gliders. The 1930 glider boom to popularize flying, appears, at least from this air show, to be giving way to these low priced, safe light planes. The reason for this is no doubt due to the recent developments of a number of low powered motors.

One of the most unusual new light planes was the new "Sky Car" designed by William B. Stout, who has recently taken his genius away from tri-motor transports to produce what he calls, "the automobile of the air."

One was immediately impressed by the metal construction and the metal covering of wings and fuselage which has been used before only on larger planes.

The actual design of this Sky Car is quite different from the conventional light plane. Its one wing has so much taper that it almost appears as though it were a V-shaped sweepback design.

The seventy H. P. Rover air-cooled engine is mounted at the rear of the cabin nacelle, and particualr care has been taken so as to make it impossible for one to get hit by the propeller after leaving the plane.

The engine is entirely enclosed with just a sufficiently large air vent to bring air to the engine to cool it. The interior of this Sky Car has been finished by the famous automobile body maker, Dietrich.

Although this plane is something entirely new it appears so very practical and safe that there seems little question that when Mr. Stout gets into production on it he will find it will be readily accepted.

Besides the Sky Car there are only three other of the eleven light planes that POPULAR AVIATION has not presented in recent issues. These three are the Cloud Coupe, the Rearwin, and the Alexander Coupe, of which only a very brief description will be given here.

The Cloud Coupe is of sesqui monoplane design, the only light plane of this kind exhibited. Not only is this unusual wing design used, but the wings can be folded back, enabling the owner to keep it in much smaller quarters.

It is a two place job with side by side seating arrangement. A seventy H. P. Le Blond motor is used as standard equipment. This ship is priced at $1,850.00, which includes flight instruction.

The Rearwin "Junior" is a two place (tandem seating arrangement) monoplane, which sells for $1,795.00. It is just enough larger than the other light planes that it should hardly be classed as a light plane. The one open cockpit is quite large enough for two large people. It is equipped with a forty-five H. P. engine.

The Alexander Coupe is a two place monoplane with side by side seating arrangement. It is a very attractive plane priced at $1,425.00 and proved to

be a very popular exhibit at the show.

The Franklin Glider was the only glider exhibited. This display and particularly its demonstration flight, was something of unusual interest.

A standard Franklin Glider was shown hung from the ceiling with the regular cowling which slips on after the pilot is seated in the cockpit. Directly in front of the glider was hung the special powered cowling. On the nose of this special powered cowling is located a small ten H. P. Andrews Johnson motor.

On the field this glider was first flown without power, then the other cowling was put on (which didn't take over five minutes), the tiny motor was started, and the then powered glider actually took off under its own power.

Several of the larger plane exhibitors poised their planes to simulate full flight. One of the Pitcairn Autogiros was displayed in a very attractive setting. It was shown, with its propellor and upper blades whirling, just as it was about to land on a golf course right in front of a country club.

THOSE who enter the hangar from the landing area immediately had their attention arrested by a giant figure of a man hoisting a new six-ton Ford freighter on his shoulder in an attitude similar to Atlas holding the world on his shoulders.

And not to be outdone by the proponents of heavier than aircraft, the Goodyear-Zeppelin Corporation showed a model of the U. S. S. Akron, the big navy dirigible that is soon to be launched at Akron, Ohio.

It was displayed in an attractive booth constructed of the same kind of duraluminum metal girders with which this famous ship is being constructed. A model of the huge hangar which will house this enormous dirigible was also on display.

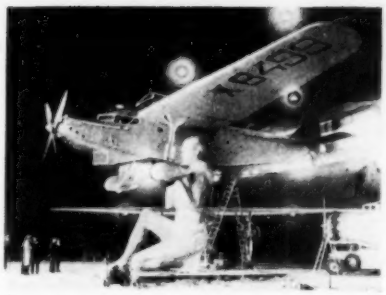
A 15-foot model of the Armstrong Seadrome was exhibited. It showed very clearly how this 1,100-foot long man-made island is intended to ride the waves in the middle of the ocean. This very interesting model included miniatures of the hotels, hangars, etc., just as they will be on the real seadrome.

Banked around the airplane exhibits and flanking the walls, more than 1,000 feet long were gathered 121 accessory exhibits, showing every conceivable device that goes into the construction and operation of an airplane.

New controllable pitch propellers with which engineers have long sought to increase the efficiency of airplanes were grouped with new type engines, beacon lights, radio telephones and enough other equipment to give spectators a practical short course in up-to-date aeronautics.

An over generous display of flags and pennants dangling from every possible hook and great dashes of color gave the show a carnival atmosphere that was emphasized by the drone of engines constantly audible in the background.

To give POPULAR AVIATION readers



The Hispano powered single engine Ford freighter resting on the giant's shoulders.

an idea of the constant activity, not only within the hangar and circus tent, but also on the field, the writer found out from the airport manager that on Wednesday, April 15, between 11 A. M. and 7 P. M. there was an average of 153 landings and take-offs an hour.

THE complete list of airplane exhibitors, and a brief description of all the planes exhibited, is as follows:

Aeronautical Corp. of America

The concern which was a pioneer in the so-called "power glider" field are exhibiting 3 of their Aeronca models. Two of these are land planes, one being a deluxe model that, among its special equipment, has air pants over its wheels. The other model was equipped with pontoons. Priced between $1,500 and $2,000.

American Aeronautical Corp.

They exhibited one of their three-plane open Savoia-Marchetti biplanes, powered with a Kinner 125 H.P. motor.

Alexander Airplane Co.

They introduced their new 2-place cabin plane in the light plane field, selling for $1,425.

American Eagle Aircraft Corp.

Their new Eaglet lists below $1,500. It is a 2-place open monoplane, powered by Szekely.

Amphibians, Inc.

One of their 2-place Privateer amphibians, powered by a 7-cylinder Warner, was shown. It lists at $5,800.

Bellanca Aircraft Corp.

Chief of interest was the 12-passenger Aircruiser, powered with a Curtiss Conqueror. Beside this job was the better known Pacemaker, a 6-passenger, powered by Wright 300, and also the Skyrocket, a 6-passenger, powered by Pratt & Whitney 420. These were priced at $32,900, $15,450 and $17,950, respectively.

Bird Aircraft Corp.

Bird introduced its new 5-passenger cabin monoplane with 125 H.P. Kinner. It is the first cabin job ever built by this corporation and it is priced at $4,995. A 4-passenger open biplane, with Warner 7-cylinder, at $4,250, and a 3-place open biplane at $3,895, were also shown.

Boeing Airplane Co.

A 1-place P-12b Army Pursuit plane, powered with a supercharged Pratt & Whitney 450, was shown.

Buhl Aircraft Corp.

Three of the new 1-place "Bull Pups," powered by Szekely and listed at $1,250, were on display, as well as the Airster low wing cargo plane, priced at $14,500.

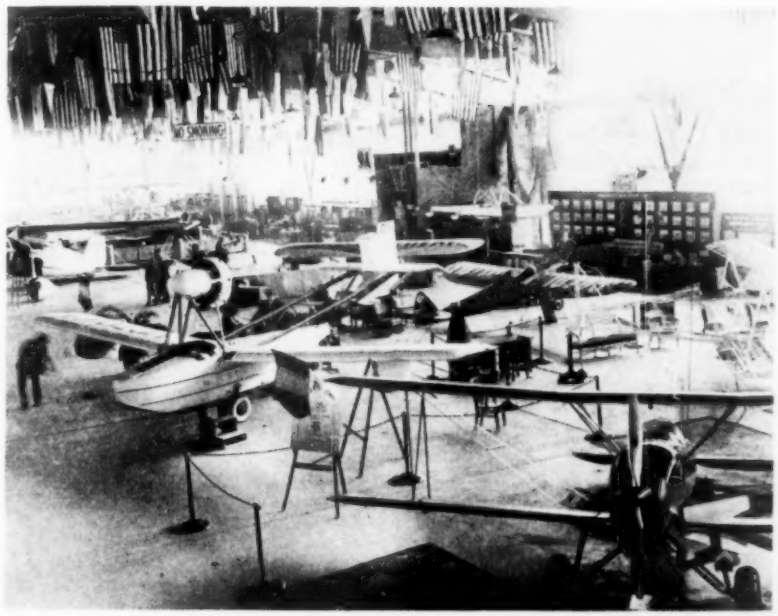
Chance-Vought Corp.

A Corsair 2-place open biplane, powered by Pratt & Whitney 420 H.P., was on display. This plane has been adopted as the official observation plane by the U. S. Navy.

Cloud Coupe Aircraft Corp.

They introduced their new sesquiplane cabin plane, a 2-place side by side light plane, selling for $1,850. It is powered with a 70 H.P. LeBlond engine.

A comprehensive view of the show. A Great Lakes Trainer in the right foreground and a Privateer amphibian at the left.

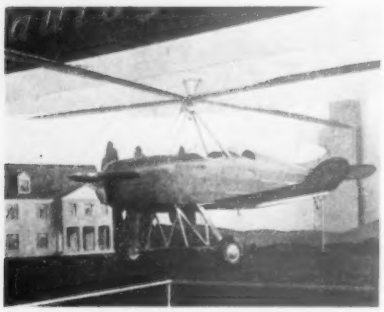


Consolidated Aircraft Corp.

Two of the Fleet biplane trainers, powered by 125 H.P. Kinner motor and one 8-passenger Fleetster, powered by a 575 H.P. Pratt & Whitney, were displayed.

Curtiss-Wright Corp.

Chief in interest was the new 2-place Curtiss Junior, powered by Szekely, and priced at $1,490. The other planes which this concern showed were, a 4-passenger cabin monoplane, powered with a 185 H.P. Challenger; a Travel Air sport trainer, powered with a 90 H.P. Gypsy; a 3-place open Travel Air sportsman, powered by Challenger; a 4-place Commuter cabin monoplane, powered with a 300 H.P. Wright; an amphibian, and a 2-place coupe, powered with a Gypsy.



The New Autogiro about to land in front of the "country club."

Detroit Aircraft Corp.

Three of the corporation's record-holding Lockheeds, two of them Vegas, one equipped as a land plane and the other with pontoons. The third Lockheed was the Orion, an all-metal cabin transport, the same as the Vegas, except that it has a completely disappearing, retractable landing gear. All the Lockheeds are powered with 425 H.P. Pratt & Whitney motors. This corporation also had an Eastman Flying Boat, equipped with a 185 H.P. Challenger motor, and priced at $6,700. A Ryan brougham, powered with a 300 H.P. Wright, was also displayed.

Douglas Aircraft Co., Inc.

A two-motored Dolphin, a cabin mono amphibian, was exhibited. This marked the company's entrance into commercial aviation. Previously they had built merely military planes. The amphibian they exhibited was powered with 300 H.P. Wright motors, and priced at $35,000.

Driggs Aircraft Corp.

Their 2-place Skylark, powered by a 75 H.P. Rover and priced at $2,985, was displayed.

Fairchild Airplane Mfg. Co.

A 2-place open high wing monoplane was exhibited. It was powered with a 75 H.P. Rover.

Fokker Aircraft Corp. of America

A new model, introduced as F-14B, was on display. The only difference be-

(*Continued on page* 49)

What Can You See from the Air?

WHAT can and cannot be seen or heard from the air is still a mystery to most people. Thus when Roger Williams recently flew non-stop to Bermuda, and flew low over the city of Hamilton, the inhabitants waved frantically at him, and *shouted* invitations to land.

Some years ago Sir Alan Cobham, one of England's keenest fliers, had a similar experience in the heart of Africa. On his way from Cairo to Cape Town he was to land at N'Dola, a clearing in the heart of the equatorial forest. There were two cleared runways, each six hundred yards long by fifty yards wide. A smoke fire was to be lighted, to show him the drift of the wind.

"It is quite simple," related Sir Alan with a twinkle in his eye, "to imagine what a terrific landmark a landing ground of this nature must have been in the middle of a thick forest, especially when four great smoke fires were lit at each end of the cross.

"I believe I could have seen it twenty miles off, all the more easily because there were special white markings on the runways. One official, however, had many doubts as to whether I could spot the landing ground or not. For soon after we had come down and I had stepped out of the machine, he said to me:

"'Could you see the landing ground all right?'

"'Perfectly,' I replied. At which he remarked:

"'By gad, when you flew by here in a circle I thought you had missed it, and I tried to attract your attention. Did you see me wave my hat?'"

Balloon Contacts Plane in Flight

HERE we see an army plane passing under a blimp from which is suspended a long rope. The men in the plane attached a mail bag to the rope, after which the bag was drawn into the blimp.

The blimp then sank to a low level and delivered the bag to a ground station without landing.

This operation, performed over Scott Field, St. Louis, Mo., is believed to be the first successful one of its kind ever made.

JUNIOR ACTIVITIES

***Edited by* Paul W. Clough**

JAKE S. FASSETT, 17, of Woodmere, Long Island, recently received his Private Pilot's License from the Department of Commerce at Roosevelt Field.

Last summer Jake flew gliders at the Cape Cod Glider School, and he believes this helped him when it came to taking his powered plane lessons.

He is a graduate of Roosevelt Aviation School, where he was instructed by Lester "Husky" Flewellyn.

Jake soloed after only two hours of dual instruction, and his time for the private license was built up at Roosevelt Field in Fleets and Aeroncas.

* * *

George Dade, a private pilot, and Walter Heikla, student flyer of Roosevelt Field, recently bought an Aeronca up in Massachusetts and George flew it down to Roosevelt.

This older type Aeronca is a one-place job with a thirty horsepower two-cylinder motor and will be very economical for them to build up their flying time. George has almost enough solo time for his Limited Commercial License now. Walter is building up his time for a Private License.

Coming down from Massachusetts George bucked a strong head-wind and it took him about six hours to make the field.

* * *

A very fine letter was received from John C. Little of Rumson, N. J., telling us about the activities of the Rumson Aero Club.

"Pevey" West, Jr., 17 years old, of Rumson, recently returned from Lincoln, Neb., where he took a private pilot's course and received his license. "Pevey" is building a Heath Parasol which he expects to finish soon. He was elected by the Rumson Aero Club as Chief Pilot.

Gerard Granville of Red Bank, N. J., who made a parachute jump at the Red Bank Airport last summer, will make some more jumps this summer. Last year he was employed by Al Biddle of the Biddle Aviation Company, and Al piloted when he made his jump.

William Lufberron, 17, of Rumson, is Secretary of the Aero Club. Bill is also building a Heath Parasol. Last summer he was employed by the Wig Wag Flying Service of Red Bank.

Daniel Pelly, 18, of the Red Bank Air Port, will soon try again for his Limited Commercial License. His first attempt was interrupted when a wheel came off while landing, but he managed to land the plane with very little damage to it and none to himself.

* * *

Henry Bierds, 17, of Roosevelt Field, who soloed in an hour and forty minutes, is building up time for his Private Pilot's license at the Roosevelt Flying School, where he works.

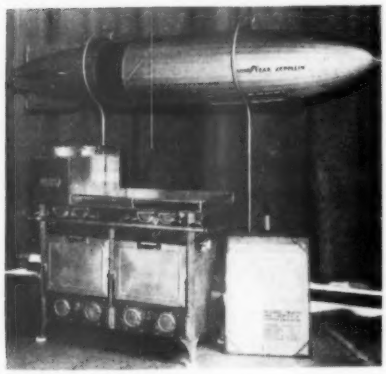
Verville Trainers for the Army

FOUR YPT-10 primary training planes powered with Wright 165 H. P. 5-cylinder engines have been delivered to the U. S. Army by the Verville Aircraft Company.

The Verville YPT-10 Primary Trainer is a two-place model, equipped with dual controls and specially designed instruments. It has a top speed of approximately 110 miles per hour, a cruising speed of 95 miles per hour, and a landing speed of 45 miles per hour. The rate of climb is 820 feet per minute. The wing span is 33 feet on both upper and lower wings, length over all is 25 feet 4 inches.

The Company officials expect that this model will be put on a quantity production basis along with the Verville Sportsman, which has proved so popular in the past.

Unique Stove Built for Navy Zep



MEALS for officers and crew of the new naval airship, the U. S. S. Akron, will be cooked on a stove that enjoys the distinction of being the only one of its kind. With its two ovens and eight burners it equals a hotel range in size and abilities, yet it weighs but 110 pounds.

Such a low weight was made possible by the use of aluminum wherever possible. In addition, stainless steel, chromium, toncan, monel metal and magnesium were also used.

Although eight vessels can be accommodated on the stove top, there are only four burners. Enclosed pans conduct heat to all parts of the top, so that each burner does double duty. At one end of the top is a container resembling a fireless cooker in appearance and action. It holds two large pots. The two ovens are thermostatically controlled.

To lessen the danger of fire, all flame is surrounded by aluminum gauze which keeps the blaze from venturing beyond restricted limits. Pilot flames that burn all the time further lessen fire danger.

The stove uses a compressed natural gas fuel, kept in a special container.

The Prince of Wales' New Plane

This De Havilland "Puss-Moth" was specially outfitted for the royal sportsman. One of the plane's most interesting features is the flight-resisting brakes.

THE De Havilland Aircraft Company has recently constructed a special "Puss-Moth" plane for H.R.H., the Prince of Wales.

The machine is a diminutive cabin monoplane of the high wing type. Normally it carries two people and a quantity of luggage but in a few minutes a third seat can be installed in the luggage compartment behind the passenger's seat.

To enable the plane to fulfill the Prince's demands it is fitted with both landing-wheel and flight resisting brakes. The former are of the usual type, but the latter require some explanation.

They are formed by the two main landing gear struts, which connect the base of the landing gear to the top rail of the fuselage, and are of rather deep section. The movement of a lever in the cabin causes these struts to rotate through 90 degrees and present their broad faces to the direction of flight. This causes a reduction in flying speed of about 35 miles an hour.

The flight-resisting brake is an invaluable fitting when it is required to land in a small field surrounded by trees. To assure a maximum of safety with the reduced speed, Handley-Page wing slots are provided.

The engine is a four-cylinder 120-h.p. Gipsy III, fitted with dual ignition. Before this type was adapted for Royal service it had to undergo a 600-hour flying test with all components sealed. The power unit is of the inverted type and because of this and the high wing construction there is better visibility in all directions than has previously been attained with any other English cabin plane.

Carrying three passengers the cruising speed is 100 to 110 miles per hour and the gliding speed is 55 to 60 with a stalling speed of 42 miles per hour.

So that the plane can be rapidly stored in a barn or large garage, the wings are made to fold back and the folding operation can be undertaken single-handed, by the pilot, in less than eight minutes.

As the plane weighs only 1,200 pounds it is possible for two men to drag it to its place of storage. When folded its length is 26 feet 3 inches, width 13 feet and height 6 feet 8 inches. The span with wings extended is 36 feet 9 inches.

A long exhaust pipe of special design and fully enclosed valve gear combine to give an unusual degree of silence. The cabin is heated so that even in the coldest weather it is possible to fly in walking clothes. In summer cold air can enter through the sliding windows and the cabin roof ventilator.

The interior trimming is luxuriously carried out in red leather, the upholstery being of the pneumatic type. The plane is externally finished in red, white and blue cellulose and carries the Prince's registration letters G-ABBS.

Curtiss-Wright Opens Factory in South America

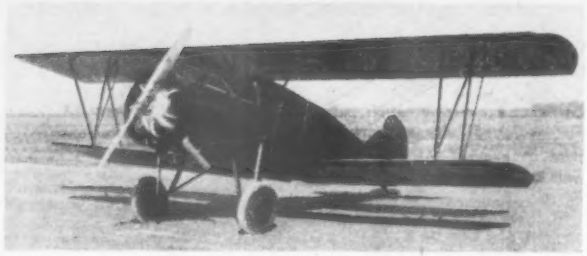
FIVE Curtiss Falcon observation planes for the Chilean Air Corps, powered with Curtiss D-12 engines of 435 horsepower, were completed recently and met successfully in flight tests the requirements set by army officials at Santiago, Chile.

These are the first planes built in the new Curtiss-Wright Export Corporation plant which is the only airplane factory in South America. They were produced on the line method of mass production installed in the plant on the model of the system in the Curtiss Aeroplane & Motor Company plant in Buffalo.

Thirty-five other planes will be completed as rapidly as possible for delivery to the government of Chile.

A view of the Curtiss factory at Santiago, Chile.

The Paramount Cabinaire-An Attractive Cabin Biplane



THE Paramount Cabinaire is a product of the Paramount Aircraft Corporation. It is a 4-place cabin biplane manufactured under an approved type certificate number 265.

Powered with a 165 h.p. Whirlwind engine the plane is priced at $5,750 at the factory. Specifications and performance data follow:

Length	24 ft., 7 in.
Height	9 ft.
Upper span	33 ft., 2 in.
Lower span	29 ft.
Weight empty	1,620 lbs.
Pay load	510 lbs.
Weight loaded	2,630 lbs.
Fuel capacity	50 gals.
Oil capacity	4 gals.
High speed	120 m.p.h.
Cruising speed	103 m.p.h.
Landing speed	40 m.p.h.
Climb	800 ft./min.
Service ceiling	12,000 ft.
Range	400 miles

Army Prefers Liquid-Cooled Motors

THE Army Air Corps is convinced that the liquid-cooled motor is the best for military purposes. The air-cooled motor has the advantage of weighing less, but officials say it has an unavoidable frontal area which creates so much air resistance that the speed is seriously reduced.

Seaplane Carted Through Streets

RECENTLY the parts of the giant "Rohrbach-Romar" flying-boat, built for France, were transported from the Rohrbach Workshops to the Westharbor, Berlin, from where it was taken to the sea-harbor Travemunde on the waterway.

This view shows the giant hull being hauled through the streets of Berlin where it caused considerable comment among the passing crowds.

Navy Planes Carry Flotation Bags

THE Navy's latest fighters, Boeing high-speed, Wasp-powered, single-seater planes, are equipped with special emergency flotation equipment. Rubber balloon-like bags are installed, folded into compartments in the wings.

If forced down, the pilot releases sufficient compressed gas into these bags to inflate them within thirty seconds, thus keeping the plane afloat. These land planes are being flown over water and must take off and land on an airplane carrier deck only two and one-third acres in area.

Radio Beacon Guides Cross Channel Planes

A RADIO beacon at Abbeville, France, will guide planes between Dover and Paris. This device consists of two frames placed a short distance apart at the airport at Abbeville. One sends out a continuous "F" and the other "L" in Morse.

These signals intersect to form a continuous straight line between Dover and Paris. As long as the aircraft is flying along this line the pilot will hear in his earphones a continuous buzz caused by the mingling of the two signals. If he deviates to one side, the buzzing merges into an "F" or an "L" signal.

The maximum error, even at Paris, eighty miles from the beacon, is only one mile, and it is proposed to install a buried cable over a mile in length, leading to the airport which the pilot can pick up at Paris, and which will guide him to his destination, even in the thickest fog.

Although both outgoing and incoming planes use the same route, there is no danger of collision, as they fly at different heights.

Some Pointers for Glider Clubs

by Speed Westphal, Commercial Glider Pilot

A GOVERNMENT glider pilot's license is, no doubt, the dream of every young man interested in aviation. Many young men all ask the same question. How is it possible to become a licensed pilot, on a small salary, such as mine?

Well, the easiest way I know is to form a glider club. Ten men at $10 each will do the trick.

When you have formed this club, you will have one hundred dollars, which will be more than necessary to purchase a glider construction kit.

When you get ready to make the buy, I would suggest, you demand actual proof of some kind, that the company you are dealing with has successfully flown their own product.

You may think that gliding is a very slow and foolish way of learning to fly, but you are wrong. Gliding is the best and easiest form of primary training obtainable.

For example, a well known radio entertainer came to the glider port one afternoon and frankly admitted he had never been up before. But he was interested in gliding and wanted to take some instructions.

He had arrived at the field at two-thirty, and by three o'clock he was making flights that would have easily passed the requirements for a glider pilot's license.

For your first two or three flights, do not attempt reaching a height greater than the distance from your fuselage to the wing tip. For instance, if your glider has a wing spread of 32 feet, half of this distance or sixteen feet should be the limit of your height.

The reason for this precaution is so that if you lose control of your wings, from a side gust or updraft, you will not be at an angle great enough to destroy the low wing, for if this wing touches the ground, your weight will bring the glider down to normal position, instead of allowing it to go over on its back.

A good release on the glider, as well as on the car, are two things of great importance and should not be overlooked. Always remember, DO NOT TAKE UNNECESSARY CHANCES. Flowers are very nice things to see in the spring, but they are no good to you after the fall, if you get what I mean.

After your club of ten men have mastered the primary glider, accept four or five new members into the club. Their money paid in for membership will easily cover the expense of material to convert your primary into a highly maneuverable secondary, in which you should be able to pass the flight test for a government commercial glider pilot's license, and if the glider industry keeps progressing like it has in the past year, commercial glider pilots will be in great demand.

During the last several months I have been asked the following questions many times, so for the benefit of those in doubt I will answer them here.

Q. Do you need a license for your glider?

A. No, a license is not demanded, but an identification mark is, and it will be sent to you on request.

Q. Do you need a pilot's license to fly a glider?

A. No, a pilot's license is not required.

Q. How much time must you have before securing your license?

A. There is no time limit necessary.

How to Build the Heath Parasol

Part VI

The Motor Mount, Struts, Rigging and Covering

Specially written for
POPULAR AVIATION
by

E. B. Heath.

WELL, here we are on the next to the last installment of the construction of your own airplane. This month you will actually put the wing on the fuselage, make your instrument board, rig up your controls, and last of all, cover the wing and tail group surfaces.

The real hard labor is about over, and beginning this month, with the rigging especially, it will be necessary to follow instructions very closely, for no matter how carefully you have constructed each section, it is equally as important that each part be *assembled* exactly right.

Remember, your plane can be equipped with pontoons as well as wheels, and for the benefit of those that are interested in having a seaplane, the few accompanying photographs of Heath Parasols with pontoons will show just how such a landing gear will look on your plane.

Don't forget that the offer from the Heath Airplane Company still stands—that your plane will be checked over and test hopped for you, free at the Heath Airport in Chicago. Also, a test pilot will be sent to almost any section of the country, to test your finished plane for only his expenses.

In the May issue of POPULAR AVIATION, page 64, there was a short mention as to just how a Department of Commerce license can be secured for a finished home built plane if you should have any difficulty in getting an identification number.

Next month the Heath plans will be completed and at that time POPULAR AVIATION will announce the prize to be awarded to the reader who first completes his plane and flies it from these plans.

THE MOTOR MOUNT, STRUTS, RIGGING AND COVERING

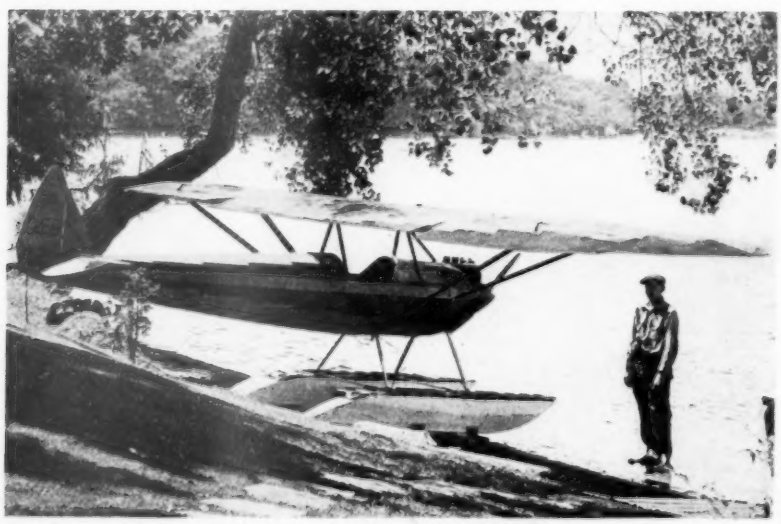
By E. B. Heath

THIS month you will need a carpenter's spirit level, one 10" straight rib sewing needle and one 10" curved rib sewing needle in addition to the tools you have already used. The following materials will also be required:

a. Motor Mount:

V–604. 4 ¼"x1" carbon steel bolts and H. C. nuts (mounting).

The standard Heath Parasol may be converted into a practical and useful seaplane. Its performance with floats is excellent.



V–606. 4 ¼"x2½" carbon steel washers and H. C. nuts (engine bolts).
V–607. 2 10/32" bolts 1¾" long and H. C. nuts and washers (strainer bracket).
V–608. 3 ft. ash, 1¼"x1" (engine bearers).
V–609. 4 ft. steel tubing ⅝"x18 ga. (.049 (braces).
V–610. 2 pcs. 3½ ft. steel tubing ⅛"x 18 ga. (.049) (braces).
V–611. 2 ft. steel tubing ⅜"x18 ga. (.049) (reinf.).
V–612. 1 ft. steel tubing 5/16"x22 ga. (.028) (spacer).
V–613. 1 ft. ¼" cold rolled rod (tie rod).
V–614. 2 ¼" H. C. nuts and washers (for item V–613).
V–615. 5"x6"x18 ga. (.049) sheet steel (U clips).
V–616. 3"x4"x16 ga. (.065) sheet steel (strainer bracket).
V–617. 2 3/16"x1¼" N. S. bolts, washers, and L. C. nuts (braces).
V–618. 1 Gas-co-lator (aluminum) and bolts.

b. Center Wing Supports:

V– 35. 2 bolts ¼"x4¾" and H. C. nuts (att. rear spar).
V– 36. 2 bolts ¼"x6½" and H. C. nuts (att. front spar).
V–656. 6 N. S. bolts and H. C. nuts 3/16"x1".
V–657. 6 washers 3/16".
V–658. 3"x6"x14 ga. (.083) sheet steel (clamp).
V–659. 14"x⅞"x18 ga. (.049) steel tube (reinf.).
V–660. 1 pc. 50" and 1 pc. 46" streamline tubing ½"x1½"x22 ga. (.028).
V–661. 2 ft. 9/16"x22 ga. steel tubing (front center strut).
V–662. 6 in. ½"x18 ga. steel tubing (reinf.).
V–663. 12"x⅞"x18 ga. (.049) steel tube (reinf.).

c. Flying Struts and Wires:

V–670. 4 pcs. 6"x3"x18 ga. (.049) streamline tube.
V–671. 45 in. ¾"x14 ga. (.083) square tube.
V–672. 15 in. ⅝"x16 ga. (.083) square tube.
V–673. 24 pcs. ¼"x1¼" rivets.
V–674. 18 ft. ⅛" cable strand (drift wires).
V–675. 4 pcs. ⅛" cable thimbles.
V–676. 2 turnbuckles No. 326 S. F.
V–677. 2 ¼"x2" N. S. bolts and H. C. nuts.
V–678. 1 pc. 4"x1"x¾" fibre block.

V–679. 4 machine screws No. 4 36x1" and nuts.
V–680. 2 clevis pins 3/16".
V–681. 4"x⅝"x12 ga. (.109) sheet steel (wire pulls).

d. Instrument Board:

V–696. 1 sheet 3-ply wood ¼"x9½"x 20".
V–697. 1 clum switch.
V–698. 2 No. 8/32"x1" F. H. machine screws and nuts (switch).
V–699. 1 oil gauge.
V–700. 1 throttle, bright finish.
V–701. 3 No. 6/32"x½" R. H. machine screws and nuts (oil gauge).
V–702. 4 No. 8/32"x¾" R. H. machine screws, washers and nuts (throttle and brackets).
V–703. 5 ft. armored ignition cable (dual).
V–704. 2 ft. ¼" copper tubing.

d. Covering:

V– 58. ¼ lb. ¼" copper tacks (for cloth).
V–120. 30 yards fabric.
V–121. 10 gallons dope.
V–122. 100 yards binding tape.
V–123. 80 yards 1" pinked tape.
V–124. ½ lb. ribbed sewing cord.
V–125. 50 yards 1½" pinked tape (leading edge).
V–226. 2 pcs. each 20"x9/16"x22 gauge (.028) steel tube (external braces).
V–231. 1 N. S. bolt 3/16"x¼" and H. C. nut.
V–232. 2 N. S. bolts 3/16"x½" and H. C. nuts.

Procedure:

IN MAKING the motor mounting locate first the position of the engine bearers. To do this, lay a stiff board or plank (2"x8"x6 feet) along the fuselage top and clamp it to the fuselage, centered exactly between the top longerons.

It should lie flat along the top cross struts. Gouge out the plank to accommodate fittings which would prevent this. Allow one end to extend 17½" beyond the first top cross strut. The engine bearers will lie 5 1/16" below the under surface of this board.

Cut from V–608 two lengths 17¼" long as engine bearers. Four holes are bored in each piece. In the side measuring 1¼" wide, bore a 17/64" hole centered 1" from one end (rear) and ⅝" from the edges. Bore a 13/64" hole centered 13⅞" from the first and ⅝" from the edges.

In the side measuring 1" wide, drill a 17/64" hole centered 5/16" from one edge and 6¾" from the end (rear) at which you drilled the first 17/64" hole. Drill another 17/64" hole in the 1" side centered 8⅝" from the other hole in the same side and centered also 5/16" from the same edge.

Space these two engine bearers with their 1¼" sides 7¾" apart and hold them in this position by tacking strips of wood to their ends. Be sure that the sides with the bolt holes near the edge are facing each other. In this position the distance between the centers of both forward bolt holes in the top surfaces of the engine bearers is 8⅜".

Suspend these engine bearers from the plank on the fuselage top with the proper ends to the rear, so that their upper surfaces are exactly parallel to the underside of the plank and 5 1/16" below it.

The 17/64" bolt holes at the rear sides should be in the same plane with the bolt holes in the top and bottom longerons and should be 3⅝" from a line running from the bolt hole in the top longeron to the bolt hole in the bottom longeron at their inside edges.

Make the top and bottom braces first because they are bolted between the side brackets and the longeron ends. Cut two 16⅜" lengths of V–610 and reinforce all four ends for 2" with V–611. Heat the ends, flatten for 1" and drill in one end of each piece a 17/64" hole centered ⅜" from the end.

Bolt to the top longeron end and bend until the free end of the brace fits against the side of the engine bearer. Drill a 13/64" hole in this end to correspond to the hole in the engine bearer.

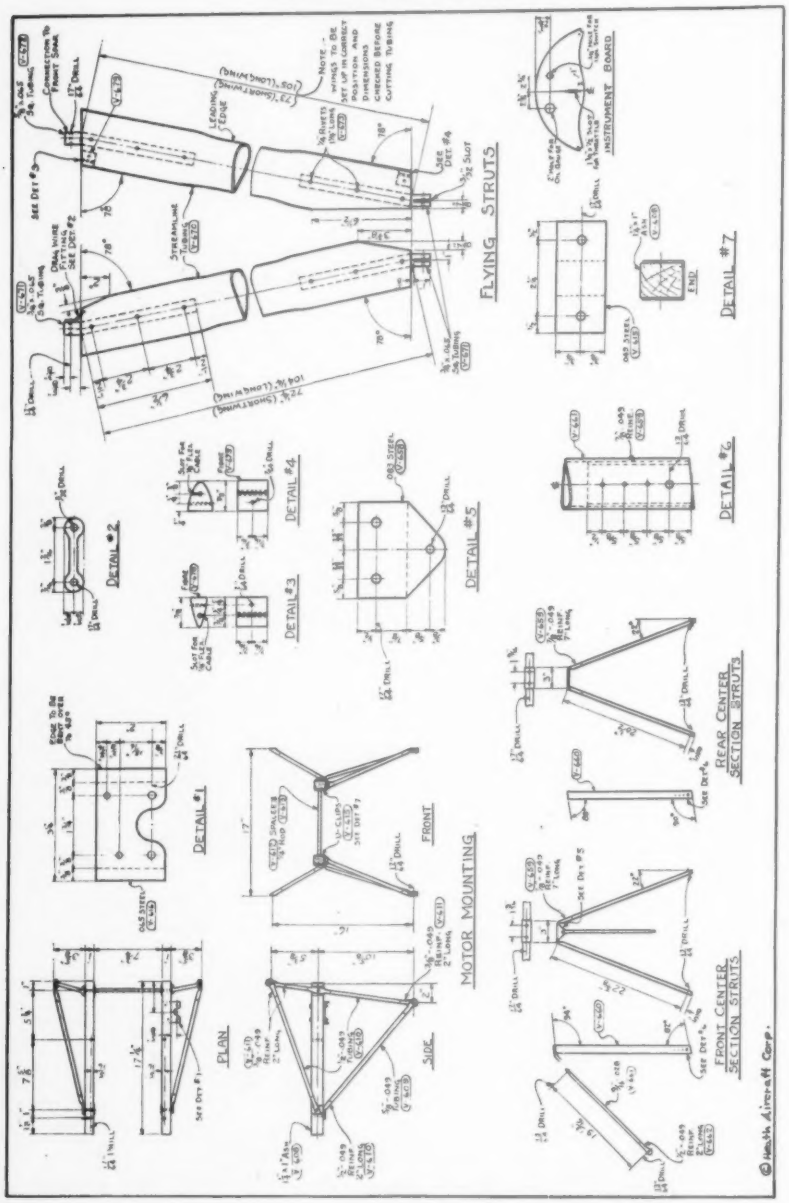
Make two bottom braces from lengths of V–609, 18¼" long. Reinforce one end of each piece for 2" with V–610. Heat and flatten for one inch and drill a 17/64" hole, centered ⅜" from the end. Reinforce the other ends for 3" and heat and flatten at right angles to the first end for 1⅜" along one edge and 1⅝" along the other.

Place these in a vise with the 1⅝" flattened edge uppermost and bend along the margin of the flattened area to an angle of 145 degrees. Bend oppositely so that you have a right and a left hand lower brace.

Bolt the straight ends to the lower longerons and bend the braces over until they fit under the engine bearers. Mark and drill in the brace ends 17/64" holes to correspond to the holes in the engine bearers.

The rear side brackets are made from two 18½" lengths of V–610. Reinforce (V–611) each piece for 4" at a point centered 7" from one end (top). Heat at this point and flatten fo: ¾".

The motor mount and struts.



A view of the bolted fuselage showing the wing supports and motor mount.

Reinforce (V–611) both ends of each piece for 2" and flatten for 1" in the same plane as before.

Offset the flattened area between the ends for a distance of 3⅜", as measured when the ends have been bent to a common plane. Measure to the top of the offset area from a level table or bench upon which the ends have been placed. Try in position for fit, remembering that the top and bottom brace ends go between the side bracket ends and the ends of the longerons.

Mark and drill 17/64" holes in the ends of the brackets and a 17/64" hole in the offset area to correspond to the 17/64" hole at the rear of the engine bearers. Bolt (V–604) the braces and brackets to the fuselage.

From V–615 make four U clips (detail No. 7) to fit on the engine bearers at the points where the side brackets and the braces will be bolted. Drill holes in the clips to correspond to the holes in the engine bearers which they support.

Fasten both rear side brackets to the engine bearers with a 10½" long tie rod (V–613) and a 7 11/16" long spacer (V–612). Both ends of the tie rod are to be threaded with a ¼"—28 die and drilled at the ends for cotter pins. High castellated nuts (V–614) are used on the tie rod.

Make a gas strainer bracket from V–616 as shown in detail No. 1 and fasten to the under side of the left hand engine bearer near the rear as shown in your print, with machine screws (V–607). Bolt the gascolater (V–618) to this bracket.

Center Wing Supports:

TAKE the 50" length of streamlined tubing (V–660) and reinforce it at its exact center with a 7" length of V–659 flattened so that it can be inserted. Mark on the streamline tubing the limits of the 3" center area to be flattened. Heat at the center, flatten and bend to the shape shown in the print.

Mark a center point on the flattened top and drill two 17/64" holes, centered 1 9/16" apart. Reinforce (V–663) the ends of the strut for 3" and rivet the reinforcement in place with three wire nails placed above the point where the bolt hole will be drilled. Drill 3/32" holes for the rivets.

Drill a 13/64" bolt hole in each leg of the strut centered 22⅝" from the top outside corner of the flattened area. The distance from the center of the bolt holes to the ends of the legs should be approximately ⅝".

The rear center section struts are built like the front except that the side legs are 2⅛" shorter and the bolt holes at the ends are centered 20½" from the top outside corner.

It is important that the height of the struts over the longerons be checked at this time. Measure from the top edge of the top cross strut vertically to the top surface of the central flattened area of the center wing supports. The height should be 21¾" for the front struts and 19¼" for the rear struts. The struts are bolted to the fuselage with 3/16" nickel steel bolts (V–656).

The third leg of the front center section strut is made from a length of 9/16" tubing (V–661), approximately 20⅝" long. Due to variances in construction it is impossible to give accurate measurements for this piece, however, if the front center section strut is tied or clamped so that it is at right angles or perpendicular to the top longerons when the third leg is being measured, the dimension will be correct.

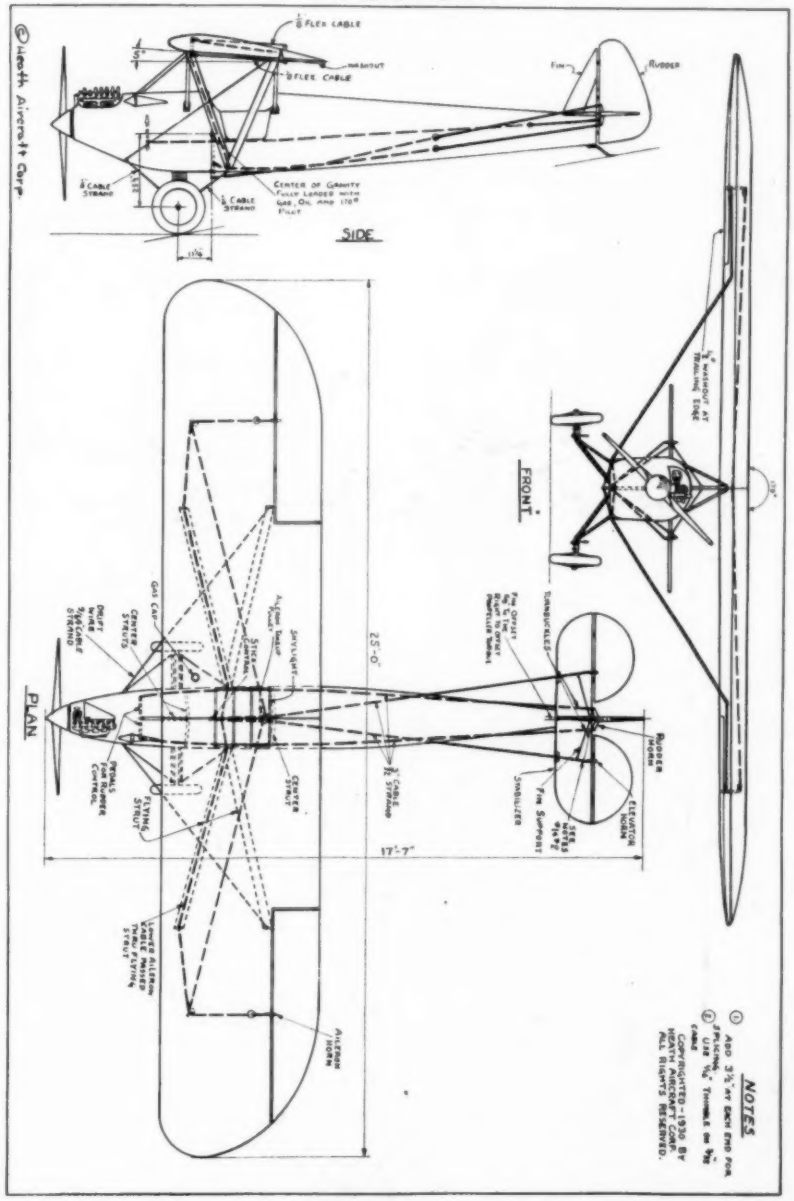
The ends of the strut are reinforced for 2" (V–662) and heated and flattened for ¾" in opposite planes. A 13/64" hole is drilled centered ⅜" from one end and the end is bolted (V–656) to the top of the pyramid.

A double fitting as shown in detail No. 5 is made from V–658. One piece is fitted beneath and one above the flattened center area of the front wing supports and drilled with two 17/64" holes centered 1 9/16" apart.

Allow enough space between the

(*Continued on page* 58)

The rigging diagram.



The Curtiss-Wright Coupe

THE Curtiss-Wright Coupe is a two-place cabin low wing monoplane, powered with a Wright Gypsy engine, 90 horsepower, and sells for $3,775, flyaway factory.

A comfortable cabin seating two, side-by-side, is finished in good taste similar to the best motor car interiors.

The seats are adjustable for comfort and may be staggered as much

as six inches. Behind the seats is a large baggage compartment.

Visibility is exceptionally good in this low-wing monoplane, the pilot being able to see in every direction. The occupants are protected by large glass windows, one of which, in the top, raises up for ventilation.

In the center of the instrument panel apron is a strong pull handle, with a positive catch. When this handle is pulled out to the first notch on the catch, the brake system is energized and caused to operate by movements of the rudder pedals. Left pedal applies left brake, and vice-versa.

When the handle is pulled out to its fullest extent, it locks both brakes, and makes it possible to warm up the engine without the use of wheel-blocks.

A wide departure from previous methods of wing construction make for strong wings. One beam only, instead of the usual two, and built like a bridge, extends from leading-edge to center-of-pressure point. This structure absorbs all stresses and distributes them properly to every part of the unit.

An unusual air-foil, or wing-curve, makes this strong and weight-saving system possible. The center-of-pressure of the curve used on the Coupe is almost constant.

Because of this unusual wing curve, very little fore-and-after adjustment is necessary. The entire load is carried very near the center of gravity and this fact, coupled with the negligible center-of-pressure travel, makes wide differences in longitudinal balance impossible.

Rate of climb, 600 ft. per min.; landing speed, 45 miles per hour; high speed, 110 miles per hr.; cruising speed, 90 m.p.h.; cruising range, 450 miles; gasoline mileage at cruising speed, 15 miles per gallon.

Length, 25 ft.; height, 8 ft.; span, 38 ft.; gasoline capacity, 30 gallons; oil capacity, 2½ gallons; weight, empty, 1136 lbs; total useful load, 611 lbs.; total gross weight, 1747 lbs.

Caterpillar Tales

SECOND Lieut. Haywood S. Hansell, Air Corps, had a thrilling experience recently when he was obliged to make a forced jump from a P-12C airplane in order to save his life. Lieut. Hansell had been testing the P-12 with a load which represented the weight of a radio set.

At an altitude of 10,000 feet he put the ship in a spin, from which he recovered after three turns. He then put the ship in a spin in the opposite direction, but after three turns was unable to resume normal flight.

He tried everything possible to recover from this spin and finally, at an altitude of between 3,000 and 3,500 feet, decided that it was useless and, after considerable difficulty, managed to push himself out of the cockpit.

The jump was made over Back River. Although he attempted to slip his 'chute in order to reach land, he was unable to do so and landed in the water about 300 feet from shore.

Lieut. Hansell had been unable to free himself from his parachute before striking the water with the result that he became entangled in the parachute shroud lines. The water was not deep, but due to the fact that he had on a winter flying suit and moccasins, he was unable to get his feet on the bottom and had to flounder around until picked up by the speed-boat.

This boat was delayed somewhat due to the fact that the water was low, and it was necessary to skate across two or three mud flats in order to reach Lieut. Hansell.

Fortunately, the new member of the Caterpillar Club received no injuries, although he suffered somewhat from exposure and the fact that he swallowed a considerable amount of salt water. The P-12 airplane which crashed close by was completely wrecked.

A New Air Camera

A NEW aerial camera, which may be used by amateurs as well as commercial photographers, has been developed by the Fairchild Aerial Camera Corporation.

A feature of the Fairchild F-8, in which it differs from other types of aerial cameras, is that it accommodates roll or cut film or glass plates. This makes unnecessary special dark room equipment now required to develop 12-foot lengths of aerial film. Any amateur or commercial photographers can develop film used in the new camera with regular equipment.

Designed specifically for aerial photography, the camera can, however, be used on the ground at distances as close as eight feet, owing to its focusable lens. It is small, light, and convenient to handle, either in an airplane or on the ground. Fully loaded, with roll film or 12 glass plates in its magazines, the camera weighs less than 20 pounds.

Car "Ads" for Planes

THE commuter who travels by aeroplane will soon have the familiar surroundings of his former land traveling for The Literary Digest announces that they have taken advertising "car" space for the coming year in regularly scheduled aeroplanes.

This is reported to be the first contract signed by Air Ads, Inc., who are contracting for all advertising space in a number of aeroplane lines throughout the United States.

The first copy for The Literary Digest is scheduled to appear March 15th on the Ludington Lines operating between New York, Philadelphia, Washington and Baltimore.

Over four hundred thousand passengers were carried by regularly scheduled aeroplanes service during 1930 according to Clinton Elliott, Vice-President of Air Ads, Inc., who says that he expects that this new advertising service will serve an audience of at least three million paying passengers within the coming five years.

Hawks is Pinched for Speeding

CAPT. FRANK M. HAWKS, who has flown at 200 miles an hour between Boston and New York in an airplane unmolested, was overhauled and reprimanded on the Boston Post road recently for traveling a mere 50 miles an hour in an automobile.

Training Device Proves Popular

THE Trainair, while an amusement device, was originally intended for the purpose of flight instruction. The device is a regular plane with wings, cockpit, rudder, and a whirling propeller, driven by a powerful motor.

Riders actually go through all motions and get the real sensation of airplane control—and in perfect safety because it is mounted on a pedestal that permits free operation without leaving the ground.

Here we see the Trainair in operation in the downtown section of Oakland, Cal.

XUM

Practical Lessons in Flying

by JOHN B. RATHBUN

Instructor Ed Takes Bob Cross Country

"IT'S only going to be a short trip, 110 miles to be exact," said Ed, "but for the sake of information and practice we are going to make as much fuss about this little cross-country affair as if we were going to fly the Atlantic.

"You've had some instruction on mapping out a course in the ground school, but I am going to refresh your memory a little by telling you something about the compass and its cute little tricks."

Bob nodded, and confessed, "It's a long time since I've studied that navigation stuff Ed, and if you don't mind I sure would like to hear it again, particularly when it is going to be applied directly to practice. Make as much fuss as you want to about this trip—to me it is like taking a trip with Christopher Columbus."

"Of course, I know the country about here like a book," said Ed, "and better than most books at that. I could fly over to Edgebrook by noting landmarks on the way, and this would be the way that I would do it if I were going alone. However, this is going to be an instructional flight in a way, and I will act just as though it were over strange country or over water with no landmarks in sight.

"To make it short, we will fly by compass and I want to make a few remarks before we start out."

"Sit down here a minute," said Ed, "and I will sketch out a little story about why a compass doesn't always point to the north that is marked on the maps, and why you will sure get

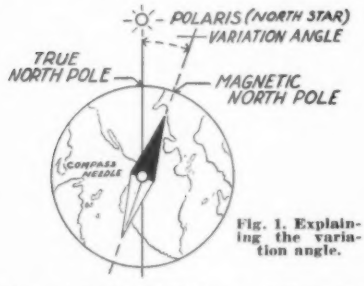


Fig. 1. Explaining the variation angle.

into a lot of grief if you follow the compass blindly without making a few readjustments.

"The north on a map is one thing, and the north pointed out by the compass is still another, as perhaps you remember."

"Now, here is a circle representing the earth (Fig. 1), and there is a vertical line through it representing the axis of the earth passing through the two poles," explained the instructor. "Now at the top of this line I will indicate Polaris, the 'North Star,' and the point where the line to Polaris cuts through the circle is the 'true' North Pole.

"If the compass pointed true north, then the compass needle would lie parallel to this line, but it doesn't and that's where the complications come in.

"Actually, the needle points to one side of the true pole, and the imaginary pole pointed to by the needle is called the 'Magnetic North Pole,' which in this particular case is east of the true pole.

"This angle between the lines of the magnetic and true north is called the

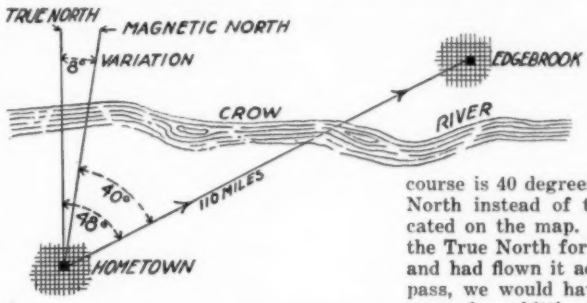


Fig. 2. Correction for variation angle on a charted course.

'Variation Angle,' and is properly given this name for the reason that the angle does not remain constant but varies at different points on the earth's surface."

"Well, if it varies at different places, then how de we ever know what it is at any time, and if we can't find the angle when we want it and where we want it, we might just as well forget about it anyway," exclaimed Bob. "What causes the variation and what are we going to do about it?"

"Well," explained Ed, "It's a long story in the telling, but the short of it is that the compass is deflected to one side or the other of the true north by local deposits of metals and minerals in the earth, and as these deposits vary, so does the magnetic north vary at the same time.

"However, the government has mapped out all of the so-called 'isoclinic lines' and has printed the charts in a book so that we can determine the variation angle with fair certainty wherever we may be. You have to get an up-to-date book, though, because the magnetic north varies from year to year and is always jumping all around the lot like a cricket."

"TO MAKE this thing clearer, I will sketch it out so that it will apply to this particular job that we are on," said the instructor, "and will make a little map for an illustration.

"Now, here is our present location at Hometown (Fig. 2) and right over here to the right is Edgebrook where we are going if I ever get these pictures finished before sunset. I will connect them with a straight line and that line will represent our course. Now I draw a vertical line to represent the true North, which when measured out on the map, will be at an angle of 48 degrees with our flight line.

"I know from the book that around here the magnetic variation is 8 degrees to the East of true North, so that I will now draw the Magnetic North 8 degrees inside of the true North Line. If your arithmetic is good, you will see that the bearing of our course is 40 degrees from the Magnetic North instead of the 48 degrees indicated on the map. If we had mistaken the True North for the Magnetic North and had flown it according to the compass, we would have been quite a distance from hitting Edgebrook.

"Strange to say, the variation can be West as well as East at certain places so that in the latter case, the variation angle would have been laid off to the left of the true North instead of to the right. If we now set our compass, we have made the first step toward finding our way, but there is just one little thing more that we must do with the compass before we start."

Bob remembered vaguely about the variation angle, but he had entirely forgotten about any other compensation that should be made. He did not remain long in the dark, though, for Ed spoke up quickly after making another sketch (Fig. 3), and showed the second compensation.

"You know that the compass needle is attracted by masses of iron and steel, just as well as it is attracted by the North and South Poles," said Ed. "Consequently, this little compass needle is going to display some partiality for the engine in the ship and for the steel tube frame that surrounds it, to say nothing of the magneto and other iron and steel parts.

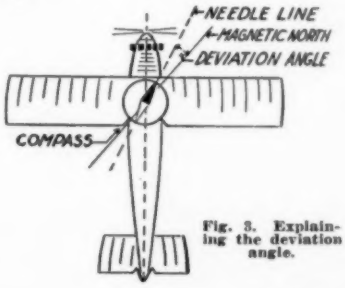


Fig. 3. Explaining the deviation angle.

"The result is that the compass don't even point to the Magnetic North when it is in place in the ship, but points in a different direction. Now take a look at this (Fig. 3) where I have shown the compass to a good big scale on the ship.

"The needle would point straight to the Magnetic North Pole if there were no steel or iron in the ship, but with the engine just ahead of it, this big mass of metal pulls the needle slightly toward it so that it points along the 'needle line.' The angle between the Magnetic North and the needle line is called the 'deviation angle', and we must take this into account as well as the variation angle."

"How do we tell what this attraction is, and how much it throws the compass off of its magnetic bearing," asked Bob, who was getting rather mixed up by this time. It was bad to make one correction, but here were two of them together that did not look promising.

"Well, we do this by what is known as 'swinging the compass,' that is, by pointing the ship exactly to the true North and then noting the deviation that the compass needle makes from the line that it should have taken had there been no metal in the ship.

"Over by the North fence there is a true North and South line that was put there by a surveyor, and we take the ships over there to adjust the compass when any change has been made in the location of the compass or when any metal parts have been added or taken away from the ship. Unless we move some part of the equipment, this deviation angle remains constant, and in this ship the deviation from the magnetic North is exactly 2 degrees west.

"THE whole blame business is shown better by this sketch (Fig. 4). You remember that our 'true course' measured from the true North on the map was 48 degrees, and that when we subtracted the 8 degree variation angle (East) that the magnetic bearing of the course, or 'magnetic course,' was then 40 degrees.

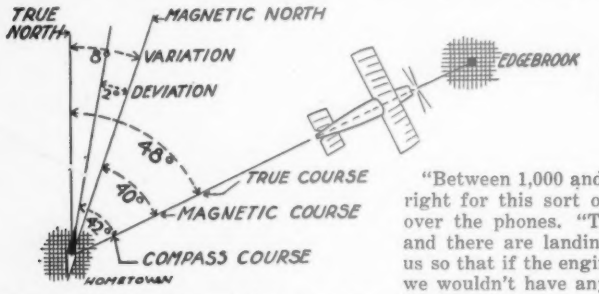


Fig. 4. Correction for both variation and deviation to find correct compass course.

"Now we have the deviation angle in the opposite direct (West), so we now add 2 degrees to the magnetic course, getting a total of 42 degrees as our 'compass course.' In other words, our course lies 42 degrees from the line of the compass needle, and that's what we will fly by."

"By the time we get this thing figured out I could have walked there," quoth Bob, "and if Lindbergh had all this to do, he sure was a glutton for punishment and a hero for not taking a steamboat. How about it?"

"Lindbergh had a whole lot harder job than that, because his trip was long enough to make it necessary to make other corrections, one of them being corrections for the spherical form of the earth. Here we have shown the diagrams just as if they were laid out on a flat piece of paper, but as you know, the earth is a sphere and this makes it necessary to correct for the earth's curvature. If you have studied spherical trigonometry you know what I mean.

"This distance that we are making is too short to make such corrections worth while, but when you fly a straight stretch of 3,600 miles without a landmark in sight, it is necessary to fly on a circle, and you have probably noted in the pictures that all of the Transatlantic flights and steamer lanes are on curved lines and not straight lines.

"The air is still today so that I won't lay out any diagrams for wind drift—I'll leave that for next time—but just you take notice and hold her at an angle of 42 degrees from the compass needle. I can easily check up on you without looking at the compass because I know the landmarks well. You hold her on the compass and I'll tell you when you're going sour."

They walked over to the ship together and made ready for the start, Bob being so familiar with the job by this time that nothing was said during the preparations. Ed climbed into the front cockpit and left the whole thing to Bob.

Down they went over the runway and into the wind, then came the takeoff and a steady climb until a wave from Ed indicated that they had altitude enough. Another wave of the hand and Bob pointed her nose to the prescribed objective — Edgebrook — watching the compass diligently the meantime.

"Between 1,000 and 2,000 feet is about right for this sort of stuff," called Ed over the phones. "This is flat country and there are landing fields all around us so that if the engine should go flooey we wouldn't have any trouble finding a landing place.

"Over strange or mountainous country with landing fields few and far between, then we should fly at from 3,000 to 5,000 feet so that we could deadstick it or glide for a long distance while hunting a field.

"If we take the best gliding angle of this ship at 12 to 1, or 12 feet horizontally for every foot of altitude lost, then at a height of 5,000 feet we would have about 12 x 5,000 = 60,000 feet in any direction for hunting a landing place. Your altitude for cross country work depends upon the nature of the country and other similar conditions."

(*Continued on page* 59)

A New Ceiling Projector

The new projector gives very accurate results.

A CEILING projector for use at airports and weather bureau stations for determining the height of clouds, fog, or haze, has been announced recently by the Westinghouse Electric and Manufacturing Company.

To determine the ceiling height it is necessary only to focus the light beam from the projector upon the clouds and to sight, through an instrument called the alidade, the light spot thus thrown on the clouds.

The alidade consists of telescopic sight mounted on a protractor; when the projector and the alidade are oriented correctly with respect to each other and when the projector is set at a given angle, the pointer on the telescopic sight of the alidade gives directly the altitude of the ceiling, the protractor being marked in feet rather than degrees.

The optical system employed in the projector produces a phenomenal beam intensity of 1,840,000 candlepower with 450 watts input. The beam divergence is 3 degrees, 42 minutes, which gives a spot less than 65 feet in diameter at 1,000 feet.

The appearance of the beam when projected upwards is that of a perfect pencil of light, consequently, quite accurate readings of ceiling heights are possible. The error at 1,000 feet is less than nine feet.

The Westinghouse ceiling projector has been adopted as standard by the United States Weather Bureau.

Graf Zeppelin's Log

A TOTAL of 104 trips, covering 69,640 miles, were completed by the Graf Zeppelin during 1930.

Beside the crew, 6,278 passengers, 12,166 pounds of freight and 19,756 pounds of mail were carried without mishap. The number of pieces of freight and mail amounted to 2,200,000. The Graf Zeppelin is at Friedrickshafen for a general overhauling and reconditioning for a proposed flight in 1931 to explore the arctic regions.

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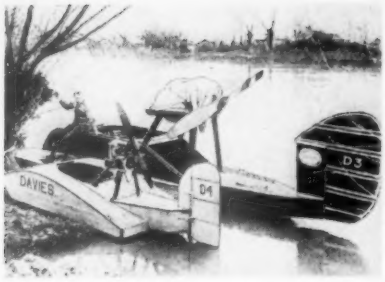


Prop-Driven Boats Resemble Seaplanes

MR. W. F. W. DAVIES, of Dudley, England, claims with his D-4 to have established a world's record by making an air-driven boat glide over the water at over 20 miles per hour with a small engine of six horse power.

Whether or not this is a record, the fact remains that in these seaplane-like hulls, Mr. Davies has produced two interesting and unusual craft that have afforded him many hours of pleasure.

Altitude Plane Being Built

THE Junkers plant at Dessau, Germany, is constructing a high altitude airplane which is expected to go up about 50,000 feet. It is a low-winged all-metal monoplane of the ordinary Junkers type.

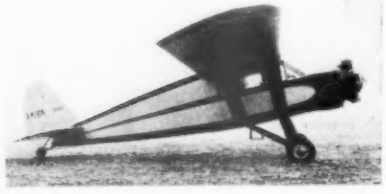
It has a wing spread of 85 feet and will weigh about 9,000 pounds. The pilots, seated in an airtight cabin, with double walls, will be kept under normal air pressure by a small compressor.

The New Curtiss Robin

THE 1931 Curtis-Wright Robin Sedan may be powered with either of three engines—the 185 h.p. Challenger, the 210 h.p. Kinner, or the 240 h.p. Whirlwind. The prices of the three models respectively are $6,370, $6,950, and $9,600.

The specifications as given here are for the Challenger powered model.

High speed	115 m.p.h.
Climb	625 ft. min.
Landing speed	48 m.p.h.
Cruising speed	95 m.p.h.
Range	545 miles
Length	27 ft. 6 in.
Height	8 ft. 10 in.
Span	43 ft. 3½ in.
Gasoline capacity	60 gals.
Oil capacity	5 gals.
Gross load	3113 lbs.
Weight empty	1975 lbs.
Useful load	1138 lbs.
Weight of passengers	680 lbs.



The First Steam Airplane

by Julius F. Johnson

HARRY HOUSE hurried up the street in Bridgeport, Conn., that warm spring afternoon in 1889, wondering why his father had sent him the urgent summons.

He had been busy at the lathe in the machine shop in which he worked, when the messenger had come for him, and now, as he approached his father's home he strained his eyes to see if the doctor's rig was before the house. Perhaps someone was sick.

The elder House was waiting on the front porch. In his hand was a letter.

"What's wrong, dad?" asked Harry anxiously.

But Mr. House's smile calmed the lad. "Nothing much, son. How would you like to go to England with me?"

Harry stopped in his tracks and thrust his hands deep in his overall pockets.

"England?" he queried incredulously. "Across the ocean?"

"Yes," replied his father. "Hiram wants us to come over and build an aerial warship for him." He rattled the letter. "Read this."

Harry took the letter. It was from their distinguished inventor friend, Hiram Maxim, then in Europe trying to interest some government in his new invention, the machine gun, which United States army experts had rejected as worthless.

In brief, Maxim had been commissioned to attempt the construction of a steam powered airplane which was to be equipped with guns, and was to have, if possible, pontoons for use on water.

Maxim himself was too busy with his other inventions to do the actual work, but he had completed the plans and desired to hire Mr. House and Harry to superintend the construction. There were plenty of funds available — a wealthy British patriot, Robert Symons, was footing all the expenses.

It took Harry just ten seconds to decide.

"I'd like to go, dad."

So they went.

Harry A. House, Jr., now a silvery-haired man in his sixties, recalled those exciting history-making days when he read John B. Rathbun's article, "The Steam Airplane Is Coming," in the April issue of POPULAR AVIATION. Mr. House is now a resident of Buffalo, N. Y.

"I agree most heartily with Mr. Rathbun's statements about the possibilities of the steam engine in aviation," declared Mr. House. "The plane we built over there in England in 1889 was equipped with steam engines, and I know the principles we worked on were sound.

"If ever there was a genius, he was Hiram Maxim, whom I regard as the real aviation pioneer. If he had not had so many irons in the fire, I know he could have developed a workable flying ship with engines operated by steam."

Mr. House was just 24 years old when he went to England with his father, and for three years they experimented and tested and labored, slowly evolving their flying machine. The scene of the work was Bakesley, in Kent, known today to every English schoolboy as the town in which Maxim's Flying Machine was built.

The first job, after their arrival, was to construct a hangar. Six men had been assembled, Mr. House and his father, two machinists, a coppersmith and a woodworker. They all pitched in on the hangar, which they called merely "the shed," and in two weeks it was completed. Then they started on the plane itself.

This is what they produced:

A giant plane 165 feet long and with 55-foot wings which folded down so the machine could be taken in and out of the hangar. It stood something like 40 feet in height. The plane was equipped with two two-cylinder steam engines which operated two pusher propellers at the rear, each 18 feet long.

The fuel was gasoline, which was vaporized before it was fired. The boiler, a tank which looked like an inverted wash tub, was of the "flash" type; that is, the water was turned instantly to steam when heat was applied.

The complete power plant, including boiler, motors and propellers, weighed about 2,500 pounds, and developed about 300 horsepower with a steam pressure of 310 pounds to the square inch. The weight of the whole machine was a little less than 8,000 pounds.

Historians have called this giant craft a multiplane, but Mr. House declares that Mr. Maxim always referred to the plane as a monoplane, because the top wing alone was intended to be the lifting and sustaining surface. There were other "wings," too, but they were to act more as stabilizers and as aids in steering the ship.

"I'll never forget what a time we had finding satisfactory propellers," said Mr. House. "For six months my father did nothing but make them and test them. He tried every kind of wood he could get, and he made the props in all kinds of lengths and shapes, two-bladed and four-bladed.

"After he had made one, he would have the woodworker carve a small model of it, which he would test in a little wind tunnel he had invented. In all, he rejected about 600 propellers before he decided on the two-blade 18-foot type."

The younger House and the other two machinists built the engines. They were small and unlike any then in existence, so they had to be hand-made entirely. Young House's special job was boring.

(Continued on page 55)

MODEL DEPARTMENT

How to Build

the

LOCKHEED VEGA

by

JOSEPH S. OTT

The newest model Army Lockheed Vega, after which this model was patterned.

JUST imagine a sleek little model that will rise up from the ground and fly away to the tree-tops, always keeping in a perfectly banked circle of about seventy-five feet. Such a model is the Lockheed-Vega.

Its tapered high wing and streamlined body give it the appearance of its big man-carrying brother, while the true pitch propeller spins around forcing it higher and higher until its rubber motor is exhausted high in the air.

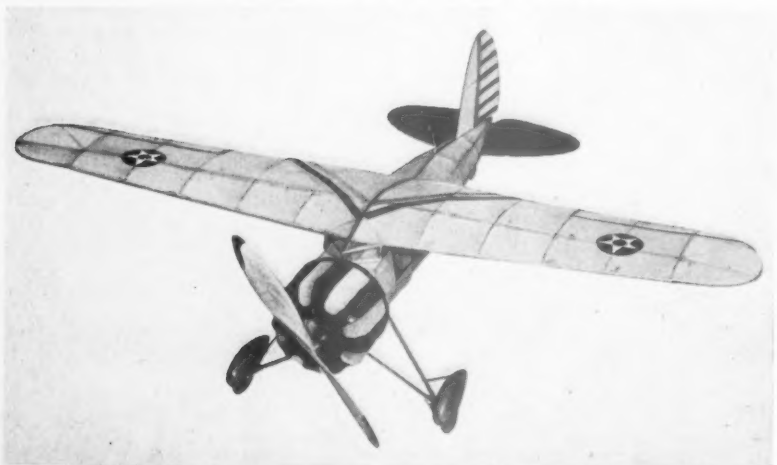
All landings are "dead stick" for this fast little climber. If a little attention is paid to the wing setting the operator need have little concern for the safety of his model because it takes just as much time coming down as it does going up.

If a friendly up-wind catches it during the course of flight it may be carried far away before settling down to its characteristic three point landing.

Materials Required

No. 1. Spars — 5 pcs.— 1/16x1/8x30"—Balsa.
No. 2. Entering Edge—2 pcs.—3/32x3/32x30"—Balsa.
No. 3. Trailing Edge—2 pcs.—1/16x1/8 x30"—Balsa.
No. 4. Longerons—8 pcs.—3/32x3/32x30" —Balsa.
No. 5. Rib Stock—3 pcs.—1/32x2½x 30"—Balsa.
No. 6. Body — 1 pc. — 1/16x4x30" — Balsa.
No. 7. Motor Base 1 pc.—⅛x¼x 30"—Balsa.
No. 8. Propeller—10"—Balsa.
No. 9. Stabilizer—2 pcs.—1/16x¼x12" Bamboo.
No. 10. Rudder—2 pcs.—1/16x¼x12"—Bamboo.
No. 11. Landing Gear—2 pcs.—1/16x¼ x12"—Bamboo.
No. 12. Wing Tips—2 pcs.—1/16x¼x 12"—Bamboo.
No. 13. Rubber—3/32x⅛"x10 feet.
No. 14. Bearing—Steel.
No. 15. Shaft—.029 Diam.
No. 16. Rear Hook—.029 Diam.
No. 17. S-Hook—.029 Diam.
No. 18. Motor Base Clip—.029 'Diam.
No. 19. 2 Spring Axles—.029 Diam.
No. 20. 4 Wing Clips (2 pr.)—.029 Diam.
No. 21. 3 Washers—⅛" O. D.
No. 22. 2 Wheels—2" Diam.
No. 23. Pants, Cowling and Nose Spinner.
No. 24. Super Fine (for wings)—2 sheets—18½x24½".
No. 25. Hokane—28x31".
No. 26. Celophane for Windshield.
No. 27. Quick-Dry Cement, Glass Jar.
No. 28. Red—Glossy Lacquer.
No. 29. Black—Glossy Lacquer.
No. 30. Banana Liquid Lacquer.

The finished flying scale model is an exact reproduction of the real plane. On this model, the cowling is built up around balsa formers.



Wings

CUT the ribs to size of 1/16" thick balsa. Notice that only one rib is necessary for the center of the wing. Make two of each of the other ribs shown.

The center rib and the two ribs on either side are notched out to receive the main spar on the rib tops and also the two sub-spars on the rib bottoms. The other ribs on out to the wing tips are cut out to receive the main spar on the rib tops only.

It is a good plan to coat the finished ribs with wing dope to strengthen the wood fibers.

The two sub-spars are cut from hard balsa 1/16x⅛" mounted with the widest side running up and down for strength. The main spar is also cut from hard balsa. In building the 30" model it is well to cut the main spar from ⅛"x¼" stock. All spars may be the same size (1/16"x⅛") when the smaller 15" model is considered.

Mount all spars with their longest cross section dimension running up and down, in which position they present more strength to the wing. The entering and trailing edges of the wings present a problem for the builder to decide for himself. If balsa is used, the wing will be light and delicate, but a rough landing against a twig or bush may break the wing beyond repair.

If split bamboo strips are used for these wing edges the wing will be very strong but slightly heavy. Some builders consider this weight detrimental to long flight. Regardless of this added weight, the model flies very well with the split bamboo leading and trailing edges.

The wing tips, however, are made of split bamboo bent to shape by heating over a candle flame. Cut the bamboo a little thick and bend it to shape. After it is set to the desired curve, strip it in two with a razor blade so as to form the two wing tips. They will then be exactly alike.

Two steel music wire wing clips can be bent and attached to the sub-spars at this time. Cement the clips to the spars and after the cement has dried for twenty minutes apply a second coat of the cement to make the clips more secure.

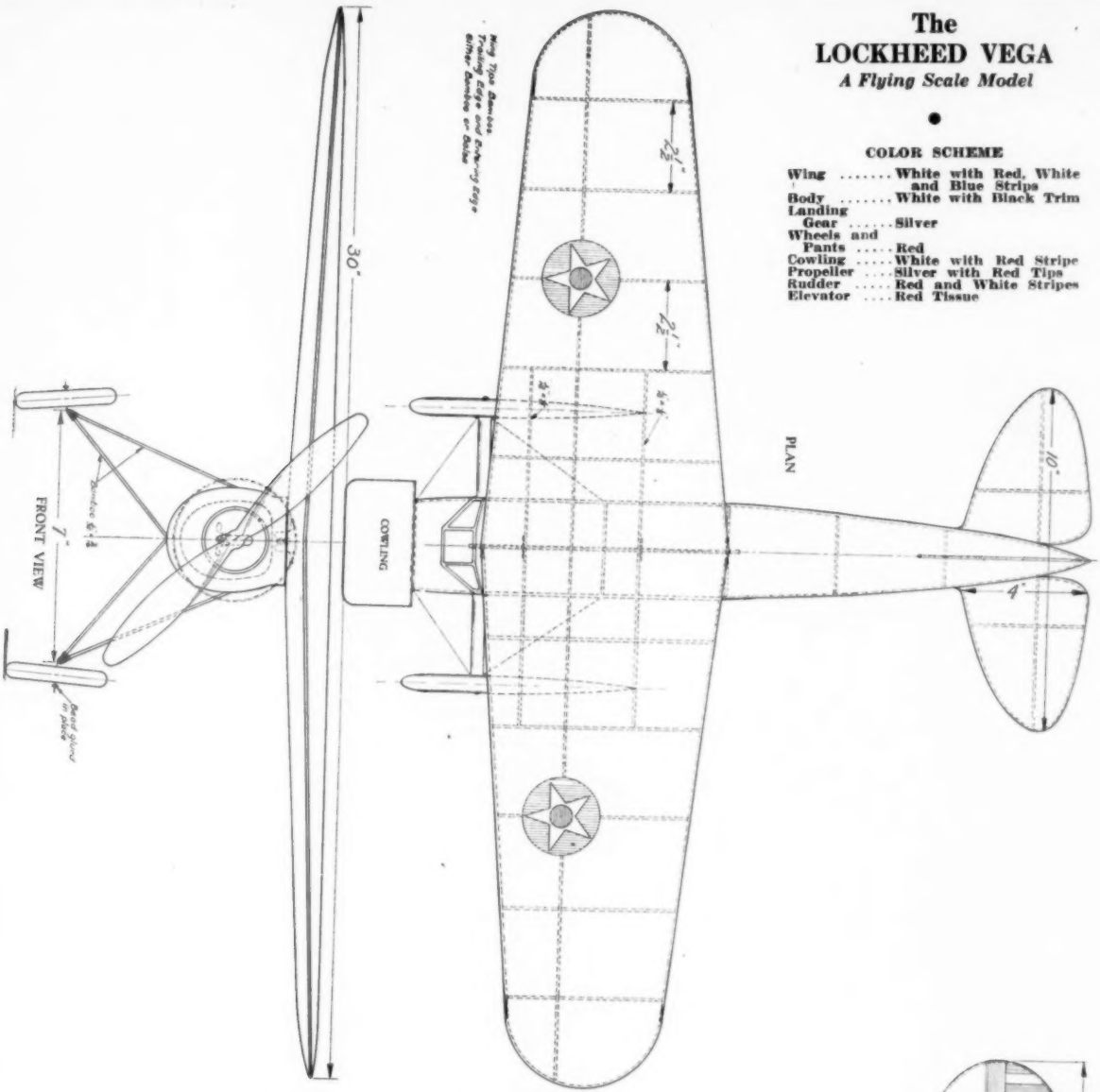
The LOCKHEED VEGA

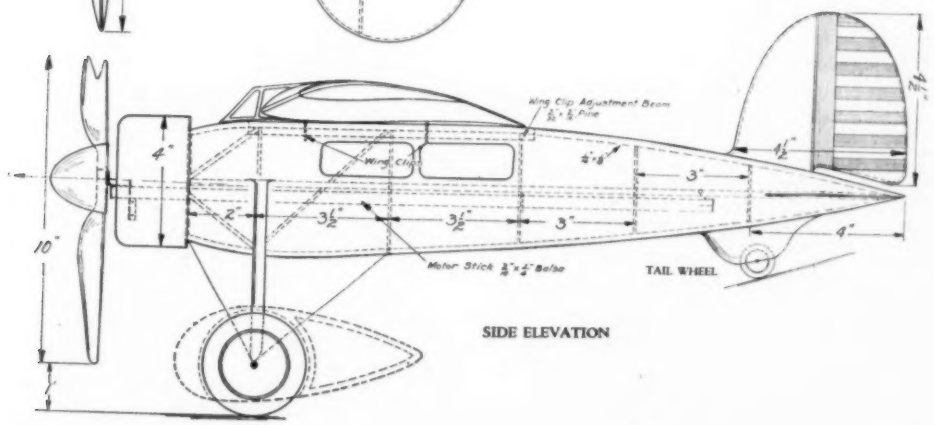
A Flying Scale Model

●

COLOR SCHEME

Wing	White with Red, White and Blue Stripe
Body	White with Black Trim
Landing Gear	Silver
Wheels and Pants	Red
Cowling	White with Red Stripe
Propeller	Silver with Red Tips
Rudder	Red and White Stripes
Elevator	Red Tissue





SIDE ELEVATION

Covering the Wing

USE Super Fine White Model Tissue for wing covering. On a flat table or bench top carefully mark the tissue to cover the top and bottom surfaces of each wing half. This may be done by laying the wing frame on the tissue. It is a simple matter to cover the tapered wing if one wing half is cut and covered at a time.

The paper is cut a little wider than necessary so that it may be trimmed for neatness after the frame is covered. If the paper tissue is wrinkled it should be placed between two heavy sheets of smooth paper and lightly pressed flat with a warm flatiron.

Fine tissue will shrink slightly when ironed in this manner so you must allow it to cool a few minutes before applying it to the wing frame.

Use model airplane cement to stick the tissue to the frame and be sure that it adheres at all points, especially the trailing edge where the overlap of surplus tissue can be trimmed with a razor blade when the cement is dry.

When the tissue is dry on the wing frame it can be moistened by brushing it lightly with a moist (not wet) sponge. The covering will dry and shrink tight. A coat of model airplane dope is then applied and the surface of the wings will be tough and air tight. The star decorations can be doped on after the wing is dry.

Body

THE cowling shown in the plan is of the N. A. C. A. type. Aluminum cowlings of this type can be purchased ready made. If the builder desires, the cowling can be eliminated and an extra large size body former cut and installed in its place.

The N. A. C. A. cowling or the front body former has a cross member of balsa to which is cemented the front steel music wire motor clip. The rear motor stick clip is cemented to the third body former counting from the rear of the fuselage.

Cut all of the body formers as shown in the drawing. If you are not using the N. A. C. A. cowling, remember to make four large formers instead of three as shown.

The side and bottom longerons run the full length of the fuselage. They are made of $\frac{1}{16}$"x$\frac{1}{8}$" balsa. Two longerons are mounted along the sides at the top of the large formers. One longeron is mounted along the top of the other formers on out to the rear of the fuselage.

The wing Clip Adjustment Beam is made of $\frac{3}{32}$"x$\frac{3}{16}$" pine. It is mounted in the notches at the top of the large body formers. The diagonal bracing shown at the front of the fuselage is optional but desirable for added strength.

The whole fuselage is cemented together, slowly building it up piece by piece so as to make certain that it dries true and in perfect alignment. The tail wheel is added after the fuselage frame is finished. Two thin balsa sides can be cemented in place and the wheel mounted between them. A wire tail skid will serve here very nicely if the streamline wheel shield looks too difficult.

Covering the Fuselage

THE superfine tissue can be cut in long panels and cemented in place on the longerons. This method has been found very efficient. Some builders desire to cut the tissue in strips of a width to extend between the formers and then wrapping the covering around the body cementing it in place in this manner.

Both of these methods work out very well in covering round model fuselages. The paper should be smooth and stretched tight. The windows can be cut and cellophane cemented in place for effect. One coat of dope is applied before the lacquer coloring is put on.

Elevator and Rudder

SPLIT bamboo is used in making the frames for the elevator and rudder. A good plan is to draw out a design of these surfaces on a smooth surface and shape the bamboo to fit the outline of the drawing.

The bamboo should be $\frac{1}{16}$" square and can be cut a little wide so that when bent to shape it can be split forming the two sides of the elevator exactly alike. A candle flame is used to heat the bamboo so that it can be bent to shape.

The frames are covered on one side with tissue. Do not use dope on the rudder or elevator covering. They are cemented in place on the fuselage set for straight level flights.

It is important to have the elevator surface in line with the top of the motor stick so that the model will fly level. If the elevator is set wrong the model will dive or stall in spite of the most careful wing adjustment.

Landing Gear

THE strut framework for the landing gear is made of split bamboo $\frac{1}{32}$"x$\frac{3}{16}$" squared. It should be sanded or scraped so that it resembles the streamlined members of a large plane. This bamboo frame is cemented to the fuselage longerons by scraping a little of the fuselage covering from the longeron and applying the cement directly to the wood.

Steel music wire axles are bent to shape and cemented to the bamboo struts using fine thread to bind them. Thread and cement used in this manner make a very secure attachment for the wheel axles.

The wheels are held in place on the axles by cementing a small glass bead on the outside of the wheel. Wheels should be made of celluloid or cut from balsa which has been cemented double thickness and cross grained.

Wheel pants can be installed and prove very effective in cutting down the landing gear resistance. The trouble of making wheel pants for the landing gear is rewarded by better flying characteristics of the model.

In the past issues of POPULAR AVIATION we have gone into detail on the simple construction of wheel pants. (April issue, page 65.)

Propeller and Motor Stick

THE motor stick is made of balsa $\frac{3}{16}$"x$\frac{1}{4}$", sanded smooth to a uniform size. The stick is then given a coat of cement, which is evenly spread all over the wood with the finger. A motor stick treated with cement in this manner is very strong, as the cement forms a seal for the wood fibers.

A thrust bearing is cemented to the front end of the motor stick and further secured by wrapping with light thread. The rear motor hook is bent from steel music wire and installed at the rear of the motor stick.

Use about ten or twelve feet of $\frac{1}{32}$"x $\frac{1}{8}$" model airplane rubber. There is a correct length for this rubber motor and you will find it by experimentation.

You should be able to get at least 200 turns, and if you can not it is an indication that you are using too much rubber for your motor.

This model flies best with a propeller of the true pitch type. It will fly with a good grade store propeller if care is exercised in securing one that is not too

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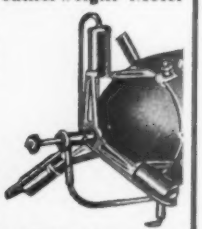
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heavy. It is a very simple matter to carve your own "prop." from a balsa block or a true pitch propeller blank.

You can carve the wood nearly to shape and then finish off with heavy sandpaper. When the shape is approximately right you can finish it smooth and balanced by light sanding with fine sandpaper.

The finished propeller should be given a coat of cement to seal the wood fibers and make it strong. The shaft is bent from steel music wire and is inserted after the carving has been completed.

Small glass beads, or the little steel washers sold by model supply stores, are used for thrust bearings between the propeller and the thrust bearing.

Flying

EVERY model airplane requires balancing in about the same manner as the large airships do at your local airport. Two factors must be in the proper relation with each other or the model will not fly successfully. These factors are: center of lift for the wings and center of balance of the whole model.

To simplify this adjustment we have installed the Wing Adjustment Beam on the fuselage which serves as an attachment point for the steel wire wing clips. The center of lift for this type of wing is usually about one-third back from its leading (or entering) edge.

You can balance the fuselage on your finger and mark the point with a pencil. The center of lift for the wing will come somewhere near this point. If the wing is first installed in this manner and a trial flight tried, the model will be nearly in flying adjustment and will land right side up without damage.

If it stalls, move the wing back on the adjusting beam. Should it dive, the wing must be moved forward in the same manner.

The ideal adjustment is to get the wing set so that the model will dive slightly without propeller power and climb steadily with propeller power. This adjustment can be easily found by studying a few flights of the model.

When the wing is properly set you can wind the "prop" up to the maximum and the little ship will actually take off from the ground for a long, well controlled flight.

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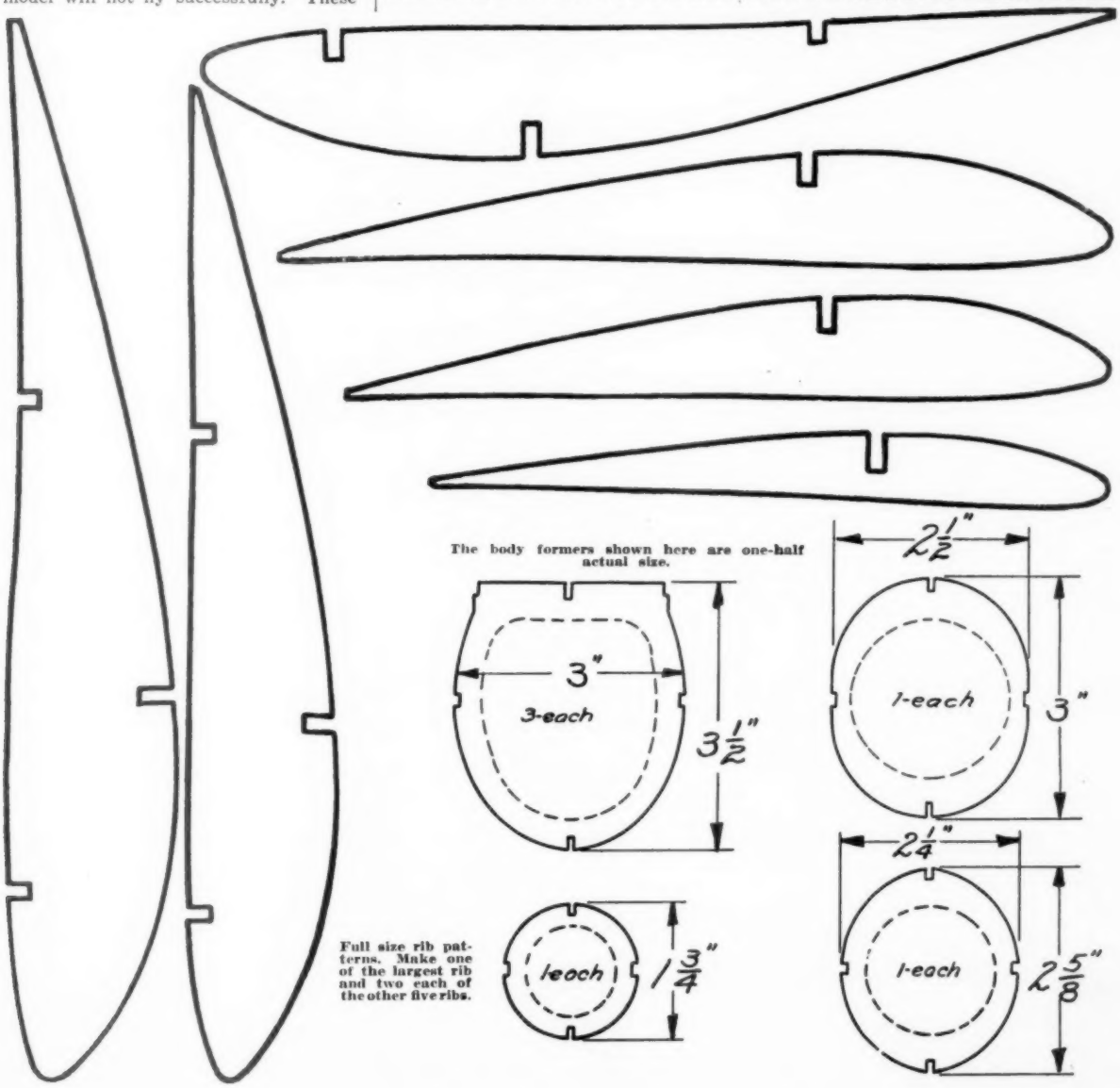

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WOMEN'S ACTIVITIES

EDITED BY LOUISE THADEN

Lady Heath is back in the United States. Next month she will assume her former position as editor of the Women's Activities Department. At this time we wish to thank Louise Thaden for her able assistance in carrying on the work of the Department during Lady Heath's absence.
—Editor.

LADY MARY HEATH, who is just thirty-four, was born in the South West of Ireland. In 1914 she began her university course, but married and went immediately after to ride motorcycles for the Royal Air Force.

She finished the war by driving the Naval visitors' car in France, and was at the time the only woman in that service in that country.

At the close of the war she returned to college, majoring in Agriculture, taking her degree in 1921. After a year or two of lecturing for universities and in organizing women's athletics, she went out to British East Africa, where she has visited eight times.

Lady Heath has represented Great Britain on International teams in Women's Athletics four times. She has held the world's record for the high jump for many years and has also won events in javelin throwing, hurdles and discus throwing.

She was the first woman in Europe to learn to fly on light aircraft, taking her private license with the London Club in 1925. She found that the 26 countries forming the International Aerial Commission of Navigation actually had a law preventing women to fly commercially.

She purchased a second-hand airplane and flew around to these countries, taking up high aviation officials. Evidently they all enjoyed their flights as they were afterward willing to vote for women to have commercial licenses.

The law was therefore changed in 1926 and Lady Heath quite fittingly became the first possessor of a commercial license. Her license was dated June 26, 1926, which was the first to be officially given in the world. Lady Heath's private license was dated November 11, 1925.

Since she began flying she has put in 2,447 hours in the air and has flown 67 types of machines, including Fokker and Ford tri-motors. In 1926 she purchased four old S. E. 5's from the British government on which she did a great deal of flying, winning a number of races in competition with men.

In 1926 Lady Heath established the first light airplane altitude record in England, with Lady Bailey as passenger, flying an Avian. On July 9, 1928, she attempted a world's altitude seaplane record, using a Short Mussel seaplane. At 13,400 ft. difficulties with instruments were encountered, and the ship was forced down. This was accepted as a British record for seaplanes, however, being conducted under the F. A. I.

Having flown all over Europe she took an Avian to South Africa in the latter part of 1927. While there she did quite a lot of flying for the Aeroplane Club system of South Africa, taking up some 7,000 people.

In 1928 she flew back to England through Northern Rhodesia, Tanganyika, Kenya and the Southern Sudan. On this trip—her last to Africa—she got a large amount of shooting, and managed to bag four buffalo, a zebra, a leopard and a few lions.

Hers was the first solo flight to be made from the South to the North of Africa, in fact it was the first solo flight between an overseas colony and the mother country. It was the first solo long distance flight to be made by a woman, covering 11,000 miles, and this record has only recently been surpassed.

Lady Heath wrote a full account of her flight for "Asia," and has also had published a book of verse called "East African Nights," a book on Women's Athletics, and shared with Miss Stella Wolfe Murray a book called "Women and Flying."

She came to America in the latter part of 1928, being employed as test pilot and demonstrator for American Cirrus Engines. Lady Heath was fly-

Lady Mary Heath displays her trophies.

ing for this firm when she was injured during the National Air Races at Cleveland in 1929, and it was thought for a time that she would not recover.

It was in August of 1930 that Lady Heath decided to return to England to complete organization of the Woman's International Association of Aeronautics. This association now has branches organized in America, Canada, Mexico, France, Switzerland and India. It is thought that England will be in shortly.

The organization has four aims: To persuade women to become pilots; to persuade women to use the air lines; to use the air mails, and to get women to give their moral support to all movements forward in aviation. Honorary members include among others: Mrs. Richard E. Byrd, Mme. Schumann-Heink, Lady Drummond Hay and Miss Amy Johnson.

Within the past month Lady Heath has again taken up her residence in the United States. Whether her adventurous spirit will let her remain for long is a matter of conjecture, for hers has been a life of variety and activity and it will probably continue to be so.

The Empire State Mast

(*Continued from page* 17)

in the zeppelin can walk out the bow of the ship, and thence down the elevators to the Empire State building in the heart of New York City.

And so, by the combination of helium gas, captive balloon, electric balance, catch line and anchor, mooring line and winch this problem is solved.

Zeppelins are now available in the hearts of metropolitan areas where they would be banished if only the hangar type of mooring was possible.

How to Leave a Spinning Ship

(*Continued from page* 21)

a ship is this. Always be a Gentleman, consider your Parachute a Lady, and see that she gets out first.

Another little thing. *Don't treat that pack too rough when you are getting out*, because they have a habit of opening when least expected. If this takes place, you'll find the cockpit full of 'chute, and, well—it means Cloud Seven for you with a Harp in your hand.

Someone may have jumped with a bag in their arms but the author has never heard of any successes in this line. He has seen some "meat wagon" occupants that looked like they might have tried it, but for some reason or other they wouldn't talk about it, and only fell seven or eight thousand feet, too.

Of course, the bag didn't open, but what's a little thing like that in a man's life? Out of ten thousand feet of fall, always remember that the last half inch hurts the most. If you keep this in mind it will give you that necessary nonchalance for a successful jump.

The Detroit Show

(*Continued from page* 34)

tween this new model and the old F-14 is a change in the wing construction and a change in the position of the pilot's cockpit. Another of these new models, finished as an ambulance plane, was also on exhibit. The third ship on display was the well-known Super Universal. All these ships are single motored, equipped with either Cyclones or Hornets.

Ford Motor Car Co.

Featuring the exhibit is a single motored freighter, in which is evidenced culmination of the company's long experiment with various types of motors. A water-cooled Hispano-Suiza, developing 600 H.P., was used. Another new job was a "high wing" with a changed motor mounting for the tri-motors. A Wright Cyclone and two Wright J-6's are used. Also on display was the deluxe edition of the line, powered with three Pratt & Whitney motors.

Granville Brothers Aircraft, Inc.

Two planes were exhibited by this manufacturer, one a 2-place, and the other the Gee Bee 1-place Sportster, both of the low wing monoplane design.

Franklin Glider Corp.

This concern is exhibiting their glider and also a power nose, which can easily and quickly be put on their glider, thus transforming it into a power glider.

Great Lakes Aircraft Corp.

Three new designs introduced, in which the company lists 11 changes, aimed to increase the stability and performance of their planes. American Cirrus 90 H.P. motors are used, and new motor mountings offer very clean streamlining.

Heath Aircraft Corp.

The earliest builder of flivver planes, exhibited two planes. One was the standard Parasol, and the other was the Center wing. These planes priced at $975.

Laird Airplane Co.

The Laird plane, with which Speed Holman won the Thompson Trophy race at the National Air Races last year, was exhibited. It is powered with a Pratt & Whitney 300 H.P. motor.

Mono Aircraft Corp.

Two of their Monocoupes, a 2-passenger cabin plane, powered with a Lambert 90 H.P., and the other with a Warner 110 H.P., were on display.

Nicholas-Beazley Airplane Co.

The new flivver type for two passengers and with folding wings was introduced. It is powered with a Szekely 45 H.P. or a Continental 35 H.P.

Northrop Aircraft Corp.

Two of their low wing all-metal cabin monoplanes were exhibited.

Paramount Aircraft Corp.

The Sportster was introduced. It is a 2-place side by side low wing monoplane, equipped only with floats.

Pitcairn Aircraft Corp.

The company which recently introduced commercially its "windmill" autogiros had three models on display.

Sikorsky Aviation Corp.

One of the 16-passenger amphibians was on display. It is powered with two Pratt & Whitney 575 H.P. motors. Also a 5-passenger amphibian was exhibited, powered by a 300 H.P. Pratt & Whitney.

Sioux Aircraft Corp.

One of their 2-place Kari-Keen coupes, powered with a 90 H.P. Warner, was on display.

States Aircraft Corp.

One of their 2-place monoplanes was exhibited. It is powered with a 100 H.P. Kinner, and priced at $3,645.

Stearman Aircraft Co.

The Junior Speedmail and the Cloudboy Trainer were displayed. Both are open biplanes.

Stearman Aircraft Co.

There were two 4-passenger Juniors on exhibit, one of them on floats, the other equipped with wheels. This ship is powered with a 9-cylinder Lycoming motor, and is priced at $5,995. There was also on display one of the Airliners, which is a transport plane, designed to carry 11 people. It is powered by three 210 H.P. Lycomings.

Swanson Aircraft Co.

The new 2-place cabin monoplane, powered with a 110 H.P. Warner motor, was displayed for the first time.

Taylor Aircraft Co.

The new Taylor Cub, a 2-place light plane, selling for $1,325, was displayed. It is powered with a 35 H.P. Continental motor.

Verville Aircraft Co.

Their new 2-place biplane, priced at $5,250 and powered with a 165 H.P. Continental motor, was displayed.

Waco Aircraft Co.

Their new 4-place cabin biplane was on display for the first time. It is powered with a 165 H.P. Continental motor. Also two 3-place open biplanes, one on floats, were on exhibit.

READERS

POPULAR AVIATION will be very glad to forward letters from readers direct to any aircraft manufacturer. Perhaps you were especially interested in a particular lightplane, model or glider described in this issue. Merely write a letter addressed to the manufacturer whose product interested you, asking for further particulars, send it to POPULAR AVIATION, and it will be promptly forwarded.

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The Hazard of Aerial Collisions

(*Continued from page* 14)

to glide into the field when the right wing of the New York, carrying Major Dargue and Lieutenant Whitehead, struck the left wing of the Detroit, carrying Captain Woolsey and Lieutenant Benton.

The Detroit, badly crushed, caught fire. Benton, perhaps injured, never left the flaming debris but burned to death with it as it fell and crashed. Woolsey jumped, but his parachute failed to open and he also was killed.

The occupants of the New York parachuted down to safety. The surviving tour members, morale shaken but unshattered, carried on and the good will flight continued back to the United States.

NOT all collisions and near-collisions are fatal or even serious. Ives McKinney and Douglas Johnson possibly never gave a second thought to the thrill they furnished observers at a flying field near Richmond in the latter part of 1928—but their planes came near enough to a crash to stir panic in several breasts.

McKinney was piloting a Standard five-place ship for a flying circus. He was the stunt man of the outfit. He was and is now considered one of the finest stunt pilots in the Atlantic coastal states.

Johnson, flying for Gulf Coast Airways, was good enough to be chosen pilot of one of the early tri-motors when they were first used on air transportation lines in this country.

McKinney had spent several days with his brother fliers near Richmond. His particular job was to lead a stunt squadron high in the air near the city, then carry the circus daredevil up and loop with the daredevil standing, arms outstretched, on the top wing.

In between times, McKinney joined the other pilots in hauling the passengers, drawn to the field by stunting, in short hops around the landing space.

The circus had completed its engagement and the other pilots had flown away. McKinney remained behind to pick up a few extra dollars from stragglers to the field. He was very busy during the day and as night drew near was still carrying passengers.

The day had been cloudy, the air was damp and as twilight dropped down, visibility for flying dropped with it. About this time Johnson came in from the north, flying a Fokker Super-Universal monoplane. He said hello to McKinney, asked the direction of the municipal airport, and took aboard two or three friends for a hop about the field before going to the municipal port for the night.

McKinney meanwhile had taken off with four passengers for a hop about the field and was coming in from the east. There was no wind, so Johnson decided to take off toward the east from the western end of the runway, where all the fliers had quartered their planes.

As he gunned the motor and started down the runway he failed to see McKinney coming toward him in the gathering dusk. McKinney also failed to see the monoplane.

Johnson had gone less than a hundred yards when he saw the Standard dipping in toward him for a landing. He instantly cut his motor, but his craft had already almost reached flying speed and he could only sit and coast down the runway, possibly with the thought of a last-minute swerve to the side if McKinney failed to see him in time.

McKinney, it seemed to the onlookers, was less than a hundred feet from the monoplane when he saw it and gunned his motor. His engine, chilled by the glide, coughed and spat, then caught and as the propeller grabbed the air McKinney banked and swerved to the right, then climbed out of the field and came in again.

Johnson turned around, took off again, made his hop about the field, left his friends and then flew to the municipal airport.

The near crash, for them, was merely an incident and all in the day's work.

STUNTING recurs again and again in these records of air crashes. Stunting has been present in almost every kind of air crash.

Stunting cost six lives in April, 1929, when an army reserve pilot, flying a fast pursuit plane, crashed into a Maddux air liner shortly after the big ship had taken off from the field at San Diego, California, for Phoenix, Arizona.

Lieutenant Howard Keefer was merely demonstrating the exuberance of spirits which is an essential characteristic of some types of good fliers. Some pilots, always self-controlled, have a deadly daring which takes them unmarred through the gravest perils of flying or air combat.

Others have to be stimulated by some outside agency and many of these take to liquor. Still others are stimulated from within by a natural exuberance of spirit once they are at the controls of a plane.

It was possibly the latter which led Lieutenant Keefer to prance and cavort about the stately and sedate transport.

The disaster occurred at an altitude of about 2,000 feet over the city of San Diego. Observers declared Keefer was high over the city as the big trimotored ship hove into sight on its regular trip.

Then began what was described as a hairbreadth game with death, with only one party playing. The liner held steadily to its course as Lieutenant Keefer dove, looped and rolled his plane about it.

Finally, when almost abreast of the larger craft, Keefer whipped his little ship into a tight roll, dropped under the liner, then headed again for the heavens.

As the tri-motor kept on its course Keefer thundered after until he was under the tail of the other ship. Then, apparently realizing too late that a crash was imminent, he attempted to swerve aside.

He was too late. The two ships came together with a crash, the fast PW-9 pursuit craft rending and tearing the left wing of the larger plane.

Crashes from a distance always look as if they were being staged for slow-motion pictures. Observers saw these two planes apparently stationary in the sky. Then they began to fall. The heavy, compact little pursuit ship plunged downward and as it fell a body was seen to detach itself and a parachute flared open.

(*Continued on page* 52)

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Aerial Collisions

(*Continued from page* 50)

But again Keefer had misjudged and this time, instead of waiting too long, he had acted too soon and snatched his rip-cord before he was clear of his ship. The shrouds caught in the broken struts of his plane and he was carried, swinging like a pendulum, to death at the side of a canyon in East San Diego.

The larger ship was falling more slowly. The pilot evidently was doing all in his power to bring it down safely, but controls were useless with one side of the large wing wrecked.

The tri-motor was seen to roll, dive, swing to an even keel and then plunge straight to the earth. It fell about 300 yards from the other flattened wreckage.

Two women passengers were alive when spectators reached the wreckage of the larger ship, but they died a few moments later. The pilot and another passenger died instantly.

The San Diego board of air control placed all blame on the pursuit pilot, referring to his evident desire to give the passengers on the liner a thrill and to his open violation of San Diego air traffic rules as well as the Department of Commerce regulations.

MANY of the present veteran pilots saw service shortly after the war with various flying circuses. Several whose names are recognized wherever American fliers are known served with Mabel Cody or with Gates.

Some had received their training before the war in the old type of pusher biplane. They often declared that these pushers were built as they were so that, in the event of a crash, the motor would not be damaged as it would have its fall broken by the body of the pilot out in front and beneath it. Motors were expensive and hard to get; daredevils were plentiful and cheap.

Russell Simon was one of these veterans. He had learned to fly with Glenn Curtiss some years after Curtiss had forsaken motorcycle racing for aviation.

Curtiss built his own motors. He had leaped into fame—and leaped is the right word, although it was his motorcycle that leaped—by building a forty-horsepower, eight-cylinder motor, mounting it on a motorcycle and traveling nearly 150 miles an hour on the world speedway at Daytona Beach, Florida.

In making that record, his motorcycle had traveled the mile course in long leaps, so witnesses said, after gaining its terrific speed in a three-mile running start.

Simon took over the Curtiss field at Newport News, Va., after the founder had left. There the Curtiss pushers were mounted on canoes and made into flying boats. Later Simon went with Mabel Cody circus, piloting one of the Curtiss Jennies she used, as lady daredevil, in transferring from one plane to another.

Simon died at Richmond, Va. Mabel Cody, an attraction at the annual fair, had just left one plane and climbed to another when a gust of wind hurled her craft into Simon's ship.

Her craft was little damaged, but the tail assembly on Simon's ship was shattered and the plane thrown out of control. Thousands at the fair that day were watching as the crippled ship plunged down. It fell from an elevation of 800 feet, coming to rest on the roof of the exposition building. Simon was almost instantly killed by the impact.

One more story and we'll leave these records of collisions and near collisions.

Hundreds had gathered at Detroit last year for the mammoth air exposition where manufacturers of planes from all over the country were displaying their newest ships.

A. H. Krieder, president of the Krieder-Reisner Aircraft Company of Hagerstown, Md., was there with one of his Challenger planes.

Captain Alan E. T. Bruce, chief test pilot of the All-American Aircraft Company of Akron, Ohio, also was there, as was William C. Naylor, chief engineer of the Stout Engineering Laboratories of Detroit.

Krieder was an old-timer at flying, making and testing his own ships, and he was exhibiting his new Challenger to the airminded who had gathered for the Detroit show.

Naylor had figured prominently in three national balloon races and at one time was president of the Detroit Flying Club.

Bruce formerly was a captain in the Royal Air Corps of the Canadian Army. He had taken part in several air battles in France and was known as a skillful pilot.

Bruce, with Naylor as passenger, was flying a Ranger plane, produced by Bruce's company and being displayed at the show. He was flying over the center of the field, about 500 feet up.

Krieder took off in his Challenger in the same direction in which Bruce was flying. The Challenger was famous for its fast rate of climb and its ability to take off from small fields and Krieder evidently was showing the hundreds watching just what his little ship could do.

He was climbing steeply over the field and failed to see the Ranger until too late. The two planes collided, locked together and started spinning to the ground.

Shortly before they struck the earth they separated, Krieder's plane spinning into the ground, killing him instantly. The Ranger slithered to earth, then turned over and flattened out, pinning Bruce and Naylor beneath the broken ship.

Bruce and Naylor were taken out of the wreckage and rushed for emergency treatment to the hospital. Naylor was found to be suffering serious injuries while Bruce's hurts were quickly fatal.

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The Women Answer

(*Continued from page* 28)

merely indulging in the bawling of the Ego-centric.

To justify the question which he shouts about, P.P. says that "at *every* airport in the country it is being argued by mail and passenger peelots;" that these men are getting all "hot and bothered" with fear that the "fems" may "chisel them out of their pay check."

I have been an inmate of airports for the last two or three years and I know a few "big time" male pilots. Not one of them is curling his toes in his shoes with dread of some woman taking his job away from him. This fact alone takes the pins from under a part of P.P.'s premise.

And what fells the last tottering remnant of it is the fact that no man need fear that *anybody* will relieve him of his job as long as he is capable of holding it. "Big time" pilots know this, and they *aren't* worrying.

We women just "ain't," in aviation, he *says*, but his vituperation overflows the measure, and with our limited brain power we are forced to absorb the notion that he means we just "ain't," generally. He enumerates 15 or 18 separate points on which we fall short and ends up by announcing that we are "thumbs down" with the public.

Now I claim that is a lot of debris to crawl out from under. *But*, and here is the joke, we are more than three-quarters of the way out, and P.P. doesn't know it. If there *are* any dumb women, he must have been attracted to them exclusively (like to like, you know), and in that way lost sight of what the rest of us were doing.

There may be some women who cry when they are criticized. But I've never seen one on an airport. When it comes to criticism, a female student pilot stands up and takes her medicine. Oh, there may be *one* exception—P.P.'s airport. His criticism would certainly call forth some sort of reaction, and if one weren't big enough to knock him down, one might as well cry—or expectorate. A lady *can't* swear.

As to feminine nerves, and equilibrium, mental and physical: I know an Old-Timer of World War vintage, who has been spending much of his time since that catastrophic event as an instructor of airplane pilots. He has had but one woman student. He was scared to death to "take her on."

But he did take her on, and she went up for her license—and got it—in record time. He has never hesitated to say that she had as good a sense of balance as any student he ever had, and better than most of them. And he always adds: "She had no nerves. I've seen her in some real tight places, but I've never seen her lose her head."

Are there more of her kind? *There are!* And that's no whisper.

The fact that P. P. thinks inability to take orders and advice is peculiar to women shows, approximately, how dumb *he* is. I ask you, how often have you seen men pilots flying too low over congested areas? How often have you seen men pilots doing vertical slips directly over a crowd? How many times have you seen men pilots zooming out of a field over the congregated heads of the populace?

You can't answer *me*, but I can tell *you* that I've seen that happen more times than make me happy to think about. If that isn't disobeying orders —from Washington—refusing to take advice and "grandstanding" all in one, then P. P. *is* the kind of a fellow he thinks he is.

Another thing: I've noticed plenty of hip flasks on airports. And they haven't been in the pockets or the hands of the women pilots either. It is strange, but true, that the male pilots of P. P.'s obvious calibre can't wrap the tentacles of the mind around the fact that alcohol and gasolene won't mix.

There, that's that. For the rest of P. P.'s accusations may be dismissed with the term "catty." A strange word with which to dispose of the accusations of a big he-man, but in my limited woman's vocabulary there isn't a better one.

Speaking of "low down," here is some from me. It doesn't take super-brawn to fly. The amount of brawn generated by what we women "call muscles" is entirely adequate, and every woman who wants to, is going to fly her share of "big time stuff."

P. P. can wreck his man's lungs trying to shout that down. His I. Q. must rate about 70, or he would long since have observed the fact that it is useless to prophesy what women *won't* do. That is just the thing they *will* do.

We have never wanted to drive locomotives or over-land busses, but some of us *do* want to fly tri-motored ships on regular runs, and we are going to do it.

P. P.'s statement notwithstanding, none of us has ever cracked, blown up, or gone to pieces on this kind of a run. None of us has ever been on such a run. And none of us will go on such a run until we have had the experience to justify our going. It takes us longer to get this experience than it does the men, for we haven't the privilege of army training. But we are going to get its equivalent, and then P. P., "stand back out of the way."

Are we going to be "thumbs down" with the insurance companies and the public, then? *Are* we? We are *not!* And, as well as for their "big time" flying, women are going to be thought a lot of for their flying should there be another war, and they are going to be thought a lot of for their flying in peace time emergencies. What kind of peace time emergencies? Oh, for example, being on hand to bring P. P. home in his own big job when he is incapacitated by, say, a hangover.

I'm willing to wager ten years of my life that whoever brings him in won't mix her instruments with her stick and rudder. Perhaps it will be the lack of instruments on his ship, rather than their multiplicity, that will be troublesome to her, for there is a suspicion back there somewhere in my convolutionless brain that she may find his "big job" to be one of those that come equipped with a gasolene gauge only.

Oh, my! Bless my soul! *Why* didn't I think of it before? Do you know, folks, a suspicion is rattling around in my head. Psychology justifies the thought that P. P.'s loud "*they will nots*" point to a fear that "*they will.*" Another bolster for this belated thought is the fact that P. P. bothers to become so vehement over what he would like us to believe he considers an impossibility.

Now, if my suspicion is correct, I think, in mercy, that we women had better make our position clear right now, so P. P. and his ilk won't have to worry any more. *We wouldn't take a job away from any one of them for the universe.* Certainly, if tradition and loud shoutings have kept the crochet needle out of their hands for all of these years, we will let them continue to do so.

But, when we get to flying "big time," P. P.—*and it won't be long now*—the old warning will still hold good, "*stand back out of the way,*" if you don't want dust in your eyes. Stand *way* back, or—Fee, Fii, Foo, Fum, we'll open the gun and give you some.

The Runaway Seaplane

(*Continued from page* 22)

functioning perfectly. The little waves that the pontoons turned up didn't make the game any easier for him either.

Treading water, the plenty wet aviator waited for the next time around, hoping that the rudder wouldn't straighten out. It came again. As it swung about the great circle there in the lake, Kaniut did some mathematical calculation in attempting to anticipate its speed, and his speed, with X the unknown point where he would have to be, to climb aboard.

Again his answer was wrong. The plane went by, just out of his arm's reach.

It was no longer a joke. It had become a matter of life and death; comical perhaps, just as life and death to the aviator often are. His algebra was better the third time, not absolutely correct, but mighty close. He was closer to the spot, he was sure of that as he caught a fish eye's view of the water bird.

But a vagrant breeze stirred the air and the motor running throttled down didn't give the seaplane much headway. It veered. Kaniut noted it just in time, and lunged. It was now or never, exhaustion was too close for a fourth attempt. With every ounce of strength he kicked himself toward his plane and managed to catch hold of a pontoon just as he was about to give up.

It was a wet, considerably bedraggled birdman, that had needed scales as well as wings that day on Lake Minnetonka. Pulling himself into the cockpit, he viciously opened up the throttle and left that lake behind and below.

Aqua-Gliding

(*Continued from page* 31)

days of spring have already shown that the combination is already in strong favor.

One of the greatest appeals of the new sport is its economy. Compared to a plane the initial cost is low and the upkeep is almost negligible.

A good standard make factory glider can be bought for less than the cheapest automobile while the man handy with tools can build his own and fit it with pontoons for only a little over a hundred dollars.

The same holds true for the boat. A racing shell suitable for a 32 to 38 h. p. outboard motor can be bought for from $100 to $350 approximately, depending upon the quality of finish desired. And the amateur carpenter capable of building his own glider can as easily construct his boat. The cost of a high powered outboard motor new runs up around $300, but the economical buyer can frequently pick one up for less.

Once the initial cost is over the financial worries are largely a thing of the past. The outboards are very low on gasoline and oil consumption, and the machines are not accustomed to spending a great deal of time in the repair shop. And as long as the student flyer will observe the rule to stay over water until he gets his experience there seems to be little danger of cracking the ship up badly or causing a hospital bill.

The young man or woman wage earner who has looked longingly but hopelessly toward owning and flying a plane is an easy prospect for a glider club, where the total cost runs only $50 to $100 per member and where there is little chance of having the investment wiped out suddenly by some foolhardy daredevil in the membership. And once they take to the air in the glider they are much more apt to find a means to eventually purchase a real airplane.

In fact the Meloons and their associates are so confident of a growing enthusiasm for this new phase of flying that they have already laid their plans for a tour of the entire eastern section of the United States this summer.

They are daily adding new stunts to their glider and outboard racing exhibition. Their latest is a parachute drop from a glider into the water. To make this possible under the limited altitude the glider can obtain with two men aboard and no uplifting air currents in Florida or in many sections where they will show, the trapeze under the ship has been lengthened and a pilot parachute will be fastened already opened. A comparatively small main parachute will be used and designed to open immediately after the jump.

All in all, the glider equipped with pontoons and using a racing shell with outboard motor seems certain to jump into quick popularity as a new recreation thrill and as an inexpensive training ground for would-be pilots.

Pitcairn Gets Collier Trophy

(*Continued from page* 15)

of times by autogiros, as have many other cities along the Atlantic seaboard, and on these trips many pilots have successfully flown them without special training.

The autogiro is the most revolutionary development in heavier-than-air craft since the first flights of the Wright brothers in 1903. The lift of an ordinary airplane is supplied by fixed or stationary wings. In the autogiro the lifting surfaces are four long wing-like rotors resembling in appearance a large four-bladed propeller. These rotate without engine power as the craft is pulled through the air by a conventional type of airplane propeller operated in the usual manner by an airplane engine.

The autogiro enables flying performance hitherto impossible. It can take off at low speed after a very short run and immediately assume a steep climbing angle. It can fly well over one hundred miles per hour or as slowly as twenty-five miles per hour. It can be brought momentarily to a standstill and hover.

It can bank and turn slowly without fear of loss of forward speed. It can glide or descend vertically with a "dead" engine at a speed less than that of a man descending in a parachute. It cannot fall into a spin. As a result of its inherent safety, little operating skill is required.

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Of "POPULAR AVIATION combined with AERONAUTICS," published monthly at Chicago, Illinois, for April, 1931.

State of Illinois,
County of Cook
ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared B. Geo. Davis, who, having been duly sworn according to law, deposes and says that he is the Editor of "POPULAR AVIATION combined with AERONAUTICS," and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are:
Publisher, Aeronautical Publications, Inc., 608 South Dearborn St.
Editor, B. Geo. Davis, 608 South Dearborn St.
Managing Editor, D. E. McMillan Jr., 608 South Dearborn St.
Business Manager, R. K. New, 608 South Dearborn St.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) AERONAUTICAL PUBLICATIONS, INC., 608 South Dearborn Street: W. B. ZIFF, 608 South Dearborn Street; DAVID ZIFF, 608 South Dearborn Street; B. GEO. DAVIS, 608 South Dearborn Street.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: NONE.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest, direct or indirect in the said stock, bonds, or other securities than as so stated by him.

B. GEO. DAVIS,
Editor.

Sworn to and subscribed before me this 30th day of March 1931.
(SEAL) ARTHUR T. PULLEN,
(My commission expires January 25th, 1932.)

First Steam Airplane

(*Continued from page* 43)

"Maxim did not take an active part in the work," Mr. House explained. "During the three years he was dealing with the British, French and Russian governments on his machine gun, and the only times we saw him were occasionally on Sundays, when he would drop down to Bakesley to see how we were coming along. He had absolute confidence in my father, and allowed him to make any minor changes or improvements he wished to."

England's interest in Maxim's Flying Machine grew as it neared completion, Mr. House recalls, and people began coming in from all parts of the empire to take a look at the strange contraption. Finally it was necessary to forbid anyone from coming on the grounds without a permit, because they interfered too much with the work.

The machine was completed and declared ready for its first test about two years after the Houses had begun building it. Mr. Maxim was notified and he came back from the European continent.

The plane was fitted with flanged wheels and ran on a 500-foot track with retaining rails above the wheels. It was not the intention that the ship should be taken off the ground on this first run.

"It seems to me thousands were there watching," declared Mr. House. "You can imagine how excited I was, and even Maxim showed a good deal of nervousness. The only calm man present was my father, and I was mighty proud of him as he took his seat under the motors which had been rigged in the top frame.

"The propellers began to whirl, the motors chugged and the machine started down the track. In 50 feet it had reached a speed of 40 miles an hour; a hundred feet further and it was making 60.

"Suddenly it toppled from the tracks and seemed to capsize into a pile of junk. I ran to the wreckage—I was the first one there, I believe, and I gave dad a helping hand out. He wasn't even scratched. Later he told me he had seen a strut snap just before the crash, which, no doubt, caused the accident.

"But though the test ended in failure, we learned many valuable things from that brief run. Most important to us was the fact that the dynometer registered a lift of 10,000 pounds against the retaining rail, which meant that the plane was able to lift 25 per cent more than its own weight, far more than even the most optimistic had thought possible."

The crash failed to daunt Maxim and the Houses. It was decided to rebuild the ship, after Mr. Symons had agreed to furnish additional funds. Fortunately, the motors had not been injured, so the repair task was the work of only two or three months.

"My father suggested to Maxim that this time we fit the machine with pontoons and try it on water, but the inventor decided against it," said Mr. House. "So the track was used again.

"This time the plane developed a speed of 90 miles an hour before it left the track and collapsed again. Dad was elated, as was Maxim. They were positive they were on the verge of perfecting a practical flying machine."

The work of rebuilding the plane had just got under way when word was brought to the Houses that Mr. Symons, Maxim's financial backer, had died. Well over $100,000 had been spent on the experiment so far. Now the funds were cut off, and the work had to be stopped.

"That precipitated a dramatic scene," Mr. House continued. "It happened in the hangar, and my father and I both were present. Maxim had been trying to get the English government to finance further experiments. On this day, a government representative came to Maxim, who was with us in the hangar, and told him the government had decided against furnishing money, as high officials were convinced the whole idea of aviation was impractical.

"Maxim told the representative England was making a grave mistake.

"'The day will come,' he said, 'when London will be bombarded from the air.'

"The man laughed at what he thought was a big joke, but Maxim lived to see his prediction come true in the Zeppelin raids of the World War."

So ended the first attempt to construct a practical steam airplane.

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George Washington Was Air Minded

(*Continued from page 25*)

other members of the Cabinet and a company of fair women, reached the scene and took their places on the north side of the court, Blanchard had inflated the big bag. Now the yellow silk globe, twenty-seven feet in diameter, filled with hydrogen gas, and held to the ground by a proud group of men, swaying lazily in the morning breeze.

Monsieur Blanchard pressed through the crowd and approached the President, who honored him signally by standing up to shake hands with him. The multitude applauded. Monsieur Blanchard, calm and graceful as a dancing master, made a profound bow.

Mr. Washington, through an interpreter, wished him a pleasant and fortunate journey. But the President did not stop at that. Curiosity ran high when the First Magistrate, taking from his pocket an official looking document, handed it to the aeronaut with a few words conveying the hope that it might at some time be of use to him if he should find himself in any sort of difficulty in the United States of America.

Blanchard, voicing his gratitude at the rate of 1,000 words a minute, got off another bow that looked like the beginning of a jack-knife dive, made obeisance to each member of the Cabinet, strode to the balloon and, clambering with agility into the unsteady basket, gave the fateful and imperious gesture that commanded the men to cast loose.

The balloon started up, straight as a die toward the sky. M. Blanchard bowed again and, displaying the French tri-color in one hand and the Stars and Stripes in the other, joyously waved his hands to the rapidly receding people.

Mr. Washington and his entourage, having witnessed the departure, went back to their homes and official duties.

According to Blanchard's diary, he had gone up "two hundred fathoms" when a gentle wind sprang up, bearing him toward the Delaware River. Some of the younger gentry of Philadelphia took to their horses and tried to follow the balloon, but the ship was travelling on a straight line at what a journalist of the time called "the amazing speed of 20 miles an hour," and the highway which the mounted men followed had many hills and curves, the result being that the would-be spectators were left far behind.

The craft stayed up fifty-six minutes and travelled fifteen miles, descending in a clearing in the New Jersey woods near Gloucester. And there was Monsieur Blanchard, unable to speak a word of English and surrounded by a crowd of farmers who pulled their long white whiskers, eyed him askance and muttered "By heck!"

But the Frenchman had the mysterious document which President Washington had given him. He now produced it, passing it over to a farmer to read aloud. It said:

"George Washington, President of the United States of America, to all to whom these presents shall come.

"The bearer hereof, Mr. Blanchard, a citizen of France, proposing to ascend in a balloon from the city of Philadelphia at ten o'clock a. m. this day, to pass in such direction and to descend in such place as circumstances shall make most convenient: these are, therefore, to recommend to all citizens of the United States, and others, that in his passage, descent, return or journeying elsewhere, they oppose no hindrance or molestation to the said Mr. Blanchard.

"And that, on the contrary, they receive and aid him with that humanity and good will which may render honor to their country and justice to an individual so distinguished by his efforts to establish and advance the art in order to make it useful to mankind in general.

"Given under my hand and seal at the city of Philadelphia, the ninth day of January, 1793, and the Independence of America, the seventeenth."

That won for the adventurer the good will and admiration of the crowd. Then, being full of gestures with hand, foot, chin and hair, the brave aeronaut put over the idea that he would like the gentlemen to haul his balloon and basket to a safe place. They got out their wagons and complied with his desire. They did more than that. They put the stranger on a horse.

But he was as much a stranger to a horse as he was to the farmers, and in the first minute of his occupancy of that saddle he discovered unforgetably that the job of riding a horse was vastly different from the business of riding the air. The luckless Frenchman got all the sensations of being tossed about in a balloon in a cyclone.

He traversed the whole length of the horse from ears to tail. He was seated, unseated and reseated with paralyzing frequency and bruising suddenness. He clung to the saddle, the horse's mane, tail and eyelashes. He became pale, wan, sick and discouraged. At last, taking swift advantage of an unexpected pause in his fiery steed's pirouetting, he abruptly and incontinently half clambered and half fell to the ground.

By that time the farmers had absorbed the idea that Monsieur Blanchard took no joy in a horse. Consequently, with their well-known hospitality, they walked with him to an inn where a carriage was provided for his transportation back to Philadelphia.

Washington, in patronizing Blanchard, proved his progressive vision in regard to an undertaking absolutely new to him. He also gave a decided impetus to the development of ballooning in America.

Everybody, therefore, who is concerned with air travel in any way will take special interest in the celebration next year of the two hundredth anniversary of Washington's birth.

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POPULAR AVIATION

608 So. Dearborn St., Chicago, Ill.

Frank Hawks

(*Continued from page* 23)

out, and I was thankful when he agreed to the proposal."

It was in just that fashion that the present speed burner across the country became initiated into aviation. He helped to patch up leaky radiators. He spread varnish and dope and sewed fabric. He changed spark plugs and dug into magnetos, and he made himself so useful that he obtained more rides and was even allowed to take the stick in the air upon occasions.

Aviation claimed Hawks from that time on. Not that he gave up everything else, but his mind's eye was focussed on air, plus speed. As a student he went in for speedy sports, sprinting and racing. He ran the two-twenty in nearly record time.

Then came the war—and more aviation. Having been an engineering student at the University of California he got through the ground school promptly and went to Brooks Field, Dallas. It took but three and one-half hours of instructions to give him his first solo.

Later he was made an instructor. He had the ability of teaching others to fly and he did it so well that he never was allowed to go to France, but while his heart was overseas he was circling around in "Jennies" at sixty to seventy miles an hour. It didn't appeal, so he resigned his captain's commission.

As nearly every flyer knows, once you have looked out over the countryside from a pilot's seat high up in the blue, nothing on the ground exactly satisfies. So with Hawks. He went to barnstorming with a group who had bought up a fleet of war training planes.

"I would have had a nice flight with my first passenger load," he recalled, "except for a board fence. I never saw a plane rolled up in a ball before with passengers and airplane all mixed together. That airplane was completely washed out. I struck the fence with my landing gear and down we came on the other side! But the strange thing about it was that no one was seriously hurt."

There was a long period of barnstorming, a school that is unequaled perhaps for training aviators, for they must know their machine and they must have confidence. This barnstorming took him to Mexico with other gypsy fliers and there he was associated with Augie Pedlar, pilot of Miss Doran in the Dole race in 1927, who was lost at sea with his plane and passengers. Pedlar, doubled as a mechanic and wing walker and did other stunts.

IT WAS after this that racing came to be the big thing to Frank Hawks, but this did not entirely satisfy.

"It was not fast enough and I turned to something else," he says. "I felt that a big opportunity could be found with some large commercial company, both to earn a good living and sell aviation to executives who are in a position to make good use of it."

It was in this selling of speed in the air that he made his first trip east from Los Angeles and set his first transcontinental record of 18 hours and 22 minutes.

The flight started on an evening in February, 1929. In the cabin was Oscar Grubb, tucked in among seventy-five five-gallon tins and armed with a pair of tin shears and a hand pump. Grubb's job was to pump the fuel by hand into the wing tanks, and then, in order to make more room for himself, to cut up the tins into strips and store them in the plane. The fear that the empties might strike and injure some one on the ground prevented him from throwing them overboard.

It was winter weather and the plane was an open-cockpit job. Up to 15,000 feet he went and stayed there. As he fought his way eastward the clouds increased until a blanket of 8,000 feet thick was between him and the earth. He felt that he would find better going north and he "crabbed" in that direction. He saw no land from West Texas until he reached some point east of the Mississippi. It was a great blanket of clouds over which he flew.

It was time to find out his location so he dropped down through more than a mile of clouds and fog only to encounter a cold, driving snowstorm. The land beneath looked like Kentucky and that was too far south. Up again with a course headed due north.

After an hour or so another trip down through the white blanket and this time the terrain reminded him of West Virginia. This time he flew beneath the blanket, twisting and winding up valleys and between mountains, working his way northward until he landed at Roosevelt Field.

"It was not so bad," he said. "I thought we might make it and I thought too, that we might have to land. I wanted to make the flight to impress the executives of my own company who were still to be convinced of the value of cross country, high speed flying. This flight helped a lot."

This record, however, was quickly broken, and Hawks remained comparatively out of the aviation spotlight until June 27, 1929. On that date, flying alone and in the same high wing monoplane in which he had established his first record, he traveled non-stop from New York to Los Angeles in 19 hours, 10 minutes, and on the following day he returned non-stop in 17 hours, 36 minutes. He had gone from coast to coast in 36 hours, 44 minutes, which gave him the cross-country laurels east and west and the round trip record.

These records continued to be recognized officially even after other fliers had made better time through the advantage of refueling stops midway at Wichita, Kansas, but as in the case of loss of his first transcontinental record, Hawks wasted no time redeeming what these competitors had taken from him.

He personally supervised the construction of a low-wing monoplane capable of a high speed of approximately 250 miles an hour, and in August of 1930 he flew from New York to Los Angeles, making five stops, in 14 hours, 30 minutes, 43 seconds. A week later he returned, making three stops, in 12 hours, 25 minutes, 3 seconds.

Subsequently Hawks flew his winged torpedo between scores of American and Canadian cities, establishing informal records between many of his takeoff and landing points. Outstanding among these flights were trips from Detroit to New York, 640 miles, in 2 hours, 41 minutes, averaging about 255 miles an hour, then an unofficial world record for speed and distance; Philadelphia to New York, 90 miles, in 20 minutes, averaging four and a half miles a minute. Many of these flights were made in 1930 for which year Hawks was chosen America's outstanding flier by the Ligue Internationale des Aviateurs.

Captain Hawks is now in Europe for an extended flying tour.

The announcement of the trip said that "the tour is being made for purely business reasons, especially to permit Captain Hawks to consult with foreign airplane and petroleum technicians, to permit him to inspect the European airports and transport lines, and to attend the International Aircraft Show in Stockholm during the week of May 15."

But from the reports that are coming back regarding the way in which this speed king is burning up the Continental airways, it seems certain that before this summer is over, there will be new records in the crown of this super-man who rides "sitting on the wind."

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XUM

The Heath Parasol

(*Continued from page* 39)

down turned ends (about 3/16") for the flattened end of the third leg. Bolt temporarily in place. Drill the bent ends of the clamp and the flattened end of the third leg with a 13/64" hole and bolt together with V–656. The gas line (V–149, see *March* issue of POPULAR AVIATION) is bound with friction tape to the under side of the third leg.

Flying Struts:

FIRST make the connecting stubs for the flying struts. Saw two 7½" lengths from V–671. Put a piece of square bar inside or plug with hard wood for a distance of 1" to prevent crushing and place the protected end in a vise for the same distance. Put a 12 degree bend in the piece at that point. Do this with each length.

Slot the short ends thus formed for a distance of 1" down the side whose planes have not been altered. The slots should be 3/32" wide so put two blades at once in the hack saw frame. Drill a 17/64" hole through the short ends centered ⅜" from the tube end and at right angles to the slots.

Arrange two flying struts (V–670) as a pair with the leading edges in the same direction. Insert the square tubing in what will be the lower ends of the flying struts. The slots in the protruding short ends should be at right angles to the broad side of the flying struts. The angle ends of the square tubing should lie parallel when the lower ends of the struts are brought to a V.

Flatten the struts to the thickness of the square tubing and rivet (V–673) as shown in the drawings. Drill a ¼" hole for the rivets.

Saw the lower ends of the struts at angles which permit of a partial overlapping so that the ends of the two pieces of square tubing will lie side by side and can be attached to the same fitting. Prepare the lower ends of the other pair of flying struts in the same manner.

Make four pieces of square tubing (two from V–671 and two from V–672) for the upper ends of the flying struts but put no slots in them and do not rivet them into the struts until you have fitted them as described in the following paragraph. The two made from ⅝" tubing belong in the upper ends of the forward flying struts.

Wing Rigging:

ELEVATE the stern of the fuselage until the top longerons are perfectly horizontal. Use a spirit level on both top longerons to determine this. Bolt (V–35 and V–36) both wing panels to the center struts on the fuselage using the wing connection plates which were described in the *February* issue of POPULAR AVIATION.

Make a light, adjustable scaffold to support each wing about two feet from the ends at the point where the rear spar begins to taper. Three 1"x4" boards and two screw clamps make a satisfactory scaffold.

Arrange the wings so that the straight line formed by the leading edges or the spars, is exactly at right angles to the center line of the fuselage. To do this run a piece of light wire from the flying strut fitting on each rear spar to the stern post. Measure and adjust until the lengths of both wires are equal. Tie the wires to hold the wings in that position.

If your center section supports are properly made there is now an inherent 5 degree angle of incidence in your wings at the center line. To determine whether your wing is set properly for a longitudinal balance measure from the center of the right hand wing bolt head under the flattened area in the front center wing support to the forward engine bolt hole in the right hand engine bearer. The distance should be 41¾".

Measure also from the same point on the center wing support to the top center of the top cross strut back of the pilot seat. The distance should be 37¾". Due to slight differences in construction these values are not absolute but the variation should not be great and should be equal on both sides.

Put a spirit level across both top longerons and raise one side of the fuselage or the other, until level. Now put a long, light board on the wing tops and place the spirit level across the wing joint. Level the wings laterally by raising or lowering the bars on the scaffolds.

After this is done put a slight dihedral angle in the wings by elevating each scaffold bar ¼" front and rear. Check with a light cord stretched tightly from wing tip to wing tip. The cord should be ¼" higher than the point where both wing panels are joined.

Put "wash-out" in the trailing edge of both wing panels near the tips by moving up the scafford bars, at their rear ends only, until the rear spar where it begins to taper had been raised ¼" above its former position. With a straight edge, a spirit level and a rule, check the relation of the rear spar to the front spar and be sure they are alike in both wing panels.

Flatten the upper ends of the flying struts slightly to hug the square tubing but do not drill any holes until the struts have been fitted and marked. Bolt (V–677) both pair of flying struts to the fuselage and insert the pieces of square tubing in their upper ends.

Now check the line of the leading edge again to be sure that it is still at right angles to the fuselage and with a spirit level make certain that the fuselage and the wings are still laterally level.

Place the flying struts in final position, drill 17/64" holes in the ends of the square tubing and bolt (V–49, see *February* issue of POPULAR AVIATION) to the spars. Mark carefully on the square tubing, the upper limits of the streamline struts.

Unbolt the struts, drill in their upper ends three equally spaced ¼" holes and rivet (V–673) the square tubing in place. (See strut drawing.)

From V–681 make two wire pulls (detail No. 2) and put a thimble (V–675) through the 7/32" hole and loop the cable (V–674) around it, serving and soldering the loop in the usual way. Install the flying struts again with the wire pulls at the upper end of each rear strut.

Attach the turnbuckles (V–676) with clevis pins (V–680) to the fittings on the lower longerons at the front of the fuselage. Measure the drift cables (V–674) to them, attach the cable to the turnbuckles with soldered loops.

Make two sets of aileron cable guides from V–678 to fit inside of the forward flying struts. Shape two as shown in detail No. 5 to be installed in the upper rear part of the struts as indicated in the drawing of the struts. These are bolted within the struts with No. 4–36 machine screws (V–679).

Do not fasten the cable guides permanently until after the aileron cables are inserted on assembly. Make two guides as shown in detail No. 6 to be attached within the forward flying struts at their lower end as shown in the drawing of the flying struts.

The Instrument Board:

THE instrument board (V–696) is fastened (V–702) to two angle brackets bolted to the fittings at the ends of the short cross brace between the two diagonals in the forward half of the cockpit. It will also be attached at the top center to an angle bracket on the underside of the cockpit cowling.

The upper edge of the board should be semicircular with a height at the middle of 8" over the center line of the short cross brace. The bottom, cut in a waved line, should extend ½" below the short cross brace at the middle.

The location of the instruments is a matter of personal choice except that if a tachometer is installed, the dial should be located on the right hand side to avoid any sharp bend in the drive shaft.

The throttle on a factory job is centrally located on the board so that it is equally available for a left or a right handed pilot. The lower bolt (V–702) on the throttle goes through the short cross brace back of the instrument board.

The switch is usually in the upper middle part of the board and great care must be taken to be certain that the wires (V–703) will not come loose at either end since a loose switch wire on a magneto makes it impossible to ground the current and to stop the motor with the switch.

A loose switch wire also renders the engine liable to unexpected starts on the ground to the possible injury of anyone standing near the propeller. This is a very real danger and only careful installation and frequent inspection can avert it.

Control Rigging:

ASSEMBLE the tail group on the fuselage. When putting on the stabilizer be sure that the offset hole to which the front of the fin will be bolted is to the right of the fuselage center line.

From V–226 make two braces to run from the bolt hole which you previously drilled in the mast of the fin to the clamp fittings on the stabilizer struts. Reinforce, heat, flatten and bend the ends to the proper angle. Drill 13/64" holes and bolt in place. Rivet (V–356, see *April* issue of POPULAR AVIATION) the clamps in place on the stabilizer.

From the materials called for in the *May* issue of POPULAR AVIATION, bend a clamp (V–476) around the third bottom cross strut as a bearing bracket and bolt (V–459) a bearing (V–457) to its top. Put the other bearing on the front end of the torque shaft, fit the shaft in place and drill holes in the bearing and the bracket on the axle fitting for No. 8–32 machine screws (V–458). Rivet (V–356) the collar at the front end of the torque shaft so that there is not more than 1/64" end play.

(*Continued on page* 62)

XUM

Practical Lessons in Flying

(Continued from page 42)

"I AM going to repeat something that you discovered on your solo flight, just so that you will remember it. If you are flying by landmarks, don't climb up so far that you can't recognize the country below you.

"The ground looks a whole lot different at 10,000 feet than it does at 1,000 feet, let me tell you, because at 10,000 feet you are too far away to see a whole lot of small things that help you in recognizing the picture."

Bob felt rather silly when Ed mentioned his adventure on his first solo, but as he expected more or less kidding on the subject, he kept silent.

"We've got a little time and I'm going to try an experiment," Ed called over the phones. "Climb her right along until you run her into that nice white fluffy cumulus cloud. You never have been cloud pushing yet, so here's your chance and I hope that we come out right side up.

"You're due for a queer sensation and I want you to realize it now while I'm with you and before you try this thing by yourself. You had one experience in a slight haze, now see what an honest-to-goodness cloud looks like from the inside."

They were climbing steadily now. 4,000 feet had passed, then 5,000 and then they smacked right into the cloud amidst a whirl of flying vapor and a strange dank penetrating dampness with a patter of mist like particles. Suddenly it became so dark that Bob could scarcely see the outline of the wings before him—and then came a sudden startling loss in his sense of direction and in his sense of the horizontal.

It was a thrill all right—this first adventure in cloudland—but he tried to keep his head and fly by his instruments rather than by judgment or any sense of feeling. He had heard before about this bewildering loss of direction and position and he now had a chance to find it out for himself.

As he thought, he had her square away on a straight climb—wings level—but he was one of the most surprised of kiwis when suddenly they sideslipped straight out of the bottom of the clouds with a surprising burst of speed.

"Ha, ha," jibed the well known voice from the front. "You thought you were going to come right straight out of the top of that bunch of fuzz, didn't you, but instead of that you fell out of the bottom on the side of your face. That's a good one to tell at supper.

"Now let me tell you. When you aim at a cloud keep your eyes on your instruments and don't move the controls unless you are dead sure of what you are doing. A cloud is the most deceiving thing on the face of the earth, except for its near cousin, a fog. It takes a lot of experience to fly blind for any distance, and I'm here to tell you that I'm no great shakes at it myself.

"When you're flying along cross-country at a good altitude keep below the cloud, go around it or over it until you've had more experience. Try to keep the earth in sight all of the time so that you can see the horizon.

"Sometimes the clouds are low, too low for safety over rough country, again there may be indications of snow or sleet, so that the only road to safety lies above the clouds and then you must climb for it.

"Once above the clouds, it is not so difficult, for the general surface of the cloud tops is horizontal and by selecting some bank of flat top clouds you have a fairly good reference mark for keeping the wings level. An occasional look down to earth through the holes between the clouds will be of assistance in locating yourself, but very often a cloud will obscure the very landmark that we are looking for, and in such cases the clouds are worse than misleading.

"In mountainous country when the clouds are down to about 3,000 feet with the crests of the mountains projecting above them for a thousand feet or so, then the only answer to the problem is to fly above the clouds to avoid worse obstacles.

"All right, now, glide down to 1,500 feet and hold it until we get to Edgebrook. This is a small town and it will be easy to pick up the field and hangars from the insignia on the roofs of the hangars."

Then they flew on in silence until finally Bob's eye caught sight of the insignia about a mile to the left of them. He started on his glide toward the field and finally made as perfect a three-pointer as he had made so far in his experience. The ship rolled down the field and then came to rest in front of a modern clean hangar.

A number of men rushed out to greet Ed, and were greatly amused at the cloud episode which Ed enlarged here, there and elsewhere until it was quite a comical yarn—to everybody but Bob.

"And there he was, backing out of the bush tail first," roared Ed, "and it was a darned lucky thing for us that Old Man Gluck didn't have to dig us out of his cornfield. Bob's a good kid, though, and got her straightened out before we had any calamities to regret. And you should have seen his face when he found that he was at the bottom of the cloud instead of coming out into the nice spring sunshine through the top!"

Ed's business concluded, he gave Bob full hand on the way home, not speaking a word until they pulled up in front of their own hangar at Hometown. It was an experience all right, and Bob looked forward with delight to the next trip and the further explanations dealing with the use of the compass and similar adventures in navigation.

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The Fighting Career of "Lucky" Peter

(*Continued from page* 10)

DEFEATED again, Peter was soon locked up back at Rastatt and this time in solitary confinement as punishment for his escape.

After four days in solitary confinement Peter was removed and carried with a detachment of prisoners to Karlsruhe. But soon he and a number of others were sent to Landshut, in Bavaria.

The camp at Landshut was devoted especially to American airmen, who were a hard lot to keep in confinement.

Peter was ever the optimist, and at no time did the idea of escape leave him. In spite of the fact that Landshut was 150 miles from Switzerland, he and his comrades worked unceasingly to get out.

Perhaps the one thing that prevented Peter's escape from Landshut was his transfer at his own request to Villingen, many miles south and only 25 miles from Switzerland.

The camp at Villingen—one formerly used for Russian officers—was well designed and considered the hardest to escape from of all their detention camps.

In addition to massive bars on the barracks' windows, they had just outside a barbed-wire fence, a couple of trenches full of barbed wire; beyond this a knitted wire fence ten feet high, surmounted by more barbed wire strung on arms that projected inwards and cut off the possibility of climbing over from the inside.

But that was not all; the guards walked post beyond this along a lighted path. Truly a formidable barrier!

Everything seemed against Peter. Nobody making his escape had been able to get out of Germany; he, himself, was weak from confinement, the cold weather was at hand.

It took a stout heart to laugh all this off, but Peter did and started collecting food and making preparations for another dash.

One day he broached a plan of escape to Lieutenant Tichenor: they could, he believed, go through the window and scale the barrier beyond.

Lieutenants Willis and Isaacs had found a way to short-circuit the electric lighting system. It was easy: they could get somebody to throw a long strand of wire having a weight on each end over the uninsulated wire that brought the current into camp. Several strands could be prepared to guard against a failure.

Breaks were to be made simultaneously through three windows by different groups, and another crowd, disguised as Germans, meant to run out with the guards to give chase and escape thus.

At ten-thirty on the night of October 6 Peter was ready. He had bought a Russian uniform and a ladder had been made from bed slats. Over his shoulder was his sack of food.

He was to jump out first, catch the ladder and put it against the outer fence. Tichenor was to follow.

The next ten minutes were the longest in Peter's twenty-four eventful years. The suspense was killing.

Would they never short-circuit the lights?

Ah! at last!

There was a sharp sizzle, the lights winked and it became completely dark. Peter, with the strength of a giant, wrenched the bar aside and, crawling through the aperture, jumped to the ground. Tichenor handed him the ladder and followed.

A shot rang out; he heard scurrying feet. But Peter couldn't wait forever; he knew the time had come.

A leap and he cleared the ditch. Throwing the ladder against the last fence, he raced up and jumped over.

In another second he was on his way, running with all his strength. Several times he fell heavily and cut his hands, but each time he recovered and ran towards the appointed rendezvous with Tichenor.

Soon his strength was spent, and he was ready to drop from exhaustion. He stopped and looked towards the camp.

Everywhere he could see little darting lights come into being as if by magic, could hear the wild commotion and cursing in swelling volume. He proceeded to the place where he was to await Tichenor.

Peter waited as long as he dared and then set out for Switzerland. He was careful to spread some pepper on his trail to throw off the blood hounds, and he waded for a mile in a creek as an additional safeguard.

With the coming of day Peter crawled into a thicket and lay down and was soon fast asleep. Upon awaking he dug some herbs and picked a few berries for food.

Another pastime quite as vital was in anticipation of the long swim across the Rhine he knew awaited him. To prepare for this ordeal, he lay on the ground thirty minutes and practised the swimming stroke.

ON THE second night out he suddenly rounded a bend on a mountainous road and saw the lights of a large town below.

He knew it was Neustadt. Should he risk getting lost in the highlands by trying a detour, or should he walk boldly through and trust to luck? He wavered but in the end chose the latter course.

Adjusting his Russian coat and pulling his rakish military cap well over the eyes, he stalked into town in the grand manner of an officer of the Prussian Guards.

The first people he met—some soldiers—he approached with fluttering heart. But everybody knows that an officer is an officer to a German soldier: look but once on the sacred, then abase yourself. The soldiers became like so many ramrods—frozen into attention. Peter saluted and passed on.

So far so good: his haughty manner and goose-steppish gait had smoothed the way, but presently he met a German officer who, for some reason, turned about and came along in rear of him.

Then Peter had that queer sensation nearly everybody has experienced of trying in the dark to walk away from someone who seems always to walk faster. He didn't dare look around, he didn't dare change his dignified manner; he could only increase his speed and hope for the best.

Never did a German walk so rapidly; his shoes rang rhythmically on the cobbles. Peter lengthened his strides and a wild tumult surged in his breast.

His apprehensions were for naught, however: the German soon entered a house by the roadside, much to Peter's relief.

The night was a succession of constant horrors. At midnight rain began to fall, and further up on the side of the mountain beyond Neustadt it turned into snow. He couldn't retrace his steps: he was lost.

After repeated attempts to scale the mountain or find a way around, he wandered into a road going down the mountain and followed this.

It led him into a highway going towards Switzerland, and Peter forged ahead until after daybreak, finally having to spend the day in a wet forest.

To do 25 miles in his Spad, in a train, in an automobile, on horseback, or even walking by daylight, was nothing, Peter knew. But to do it at night through an unknown and hostile region with fear clutching at his breast was proving the most harrowing experience of a lifetime.

The night preceding the tenth of October he covered seven miles. The next day he spent in the vicinity of Waldshut—so near and yet so far from Switzerland.

His heart beat violently that night. Barring some unforeseen hazard he would reach the Rhine before morning. At eleven o'clock he was there, looking into his "Promised Land."—Switzerland.

From high on the mountain overlooking the Rhine, Peter got a splendid view. The night was so clear that he could follow the path of the river for some distance.

He saw a place where the stream made a bend and a mile below a reverse bend. He knew what this meant; many times he had swum in the Cumberland where the waters rush into a bank on a bend and are deflected towards the opposite shore.

No doubt, here on the Rhine, he

would find eddying waters below the bend and out beyond a swift current to bear him towards the opposite shore. He would chance it anyway.

When Peter reached the bend where he meant to enter the water, he found the slope to the river's bank easy to negotiate. He lay there, then, for several hours making his final preparations and listening to the never-ending roar of the river—a mighty sound and not a reassuring one. It was the voice of whirlpools, of swift currents lashing the banks and shooting over rocks.

There was one thing in his favor: during his rest there above the river he had seen no sentry go near the bend where he thought of slipping into the river. Also, there was no fence or barrier of wire; the Germans considered the mighty Rhine enough to stop anybody.

Removing all his clothes but those he expected to swim in, Peter took his knife out and started crawling towards the river. He was not seeking trouble, but he meant nobody to keep him out of that river.

His route to the water's edge lay over a highway and railroad parallelling the river. He used extreme care not to be seen and spent almost an hour in crawling across an open area near the tracks.

Just on the river's brink he hesitated; in the distance a clock struck five; Peter waded into the water and began the swim.

Striking out he soon passed into the rushing current that bore him swiftly onward.

Ignoring now the fact that sentries might see him from the shore, he swam with all his strength. His aim was to get to the hardest part of the swim before numbness got the upper hand.

In this, however, he did not succeed. The water was unbelievably cold and so affected him that he soon became dizzy, could picture himself going to the wrong bank.

When in the middle of the river, by a supreme effort he mastered his dizziness, got control of himself and swam purposefully.

Then, at last, his goal spun out of the gloom at him. Thirty feet away it rushed by at what seemed lightning speed. Though the water was not deep here, Peter could not stand up on the bottom, nor could he find anything on the steep bank to grasp.

His strength was flowing steadily from him now.

Making a wild stab for the bank, he felt his fingers catch, they slipped a little, they dug in, then his body swung to rest against the Swiss shore.

The long struggle apparently was won. But at such cost! He was too weak to stand, he could not enjoy his freedom. Presently he labored up the bank and rolled about on the ground until his strength returned sufficiently to permit him to walk.

Day was breaking as Peter moved away from the river and came to a highway. He approached the only house in sight, and the old man who owned it invited him inside.

There he made Peter comfortable, giving him some shoes and throwing a blanket about him. He also heated some goat's milk, which he gave the American.

At last the old man spoke; but instead of French he used German!

Wild terror gripped Peter. Had he made another mistake? Was he after all in Germany? The thought made him very uncomfortable, indeed!

The Swiss were a French-speaking people, he thought, but at Peter's questioning the old man made it clear that he was Swiss.

Free at last!

A long walk to the nearest military post followed breakfast. At the post he became guest of the Swiss army, and they furnished him with clothes to wear, another breakfast and a healthy shot of liquor.

From this post, directly across the river from Waldshut, Peter, accompanied by a Swiss soldier, went to Reinfelden and from there to Berne, where he was turned over to Captain Davis, assistant military attache.

Captain Davis said that Peter was the first American officer to gain his freedom.

In a few days Peter returned to France and sought his squadron. He found that his personal effects had been divided among his mates, that his name had been removed from the pay roll in the belief that he was dead.

So there he was, without adequate clothes and with only such money as he could borrow. Truly his luck was constant, and freedom was indeed a relative thing.

"But that didn't bother me much," Peter confided in Paris the next week. "I borrowed a shirt from Willie Palmer, some socks from Joe Dawson, and I picked up an old musette bag. In fact, everything I could safely say I owned was in the bag when I popped it at the Gare de l'Est this afternoon and grabbed a taxi.

"We were steaming across town at a pretty fair rate when our taxi smashed into another. The driver of my taxi jumped to the street, so did the other, so did I, for it always amuses me to see two Frenchmen have verbal battles.

"They cussed each other royally. Cochon! This and that!

"And all at once my driver sprang into our taxi and got it going before I could reach it!

"I yelled loud as I could and chased him, but it did no good. And now even my valuable pictures, about all I had left, and everything else are gone. I had left my bag in the taxi when I got out to see the fuss."

We laughed merrily over the incident: it was the way of the Air Service in war.

"Tell me, Peter," I said finally, "about the most desperate moment you passed through in your experiences. Was it when the Germans took you into the First Aid Station, just after they captured you, and there threatened your life?"

"The most desperate moment," Peter replied, "was when I heard that old Swiss speak German. I cannot possibly tell you," he continued, shaking with excitement, "how agonizing it was. I was scared, of course—terribly so, but most horrible of all was the idea of being carried back to prison camp, defeated again. For the moment, you see, I thought that I had got turned around in the river and had swum back to the German side."

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The Heath Parasol

(*Continued from page* 58)

Elevator Cable: (Item numbers here still refer to May issue of POPULAR AVIATION)

ATTACH the turnbuckles (V–469) with bolts (V–473) to the elevators and attach the turnbuckles (V–508) to the rudder. Make a loop around a thimble (V–468) at one end of the elevator cable (V–470), served and soldered as before.

Fasten this loop to the lower end of the control stick and measure back to the turnbuckle at the elevator top horn. Allow enough cable for a loop. Cut and solder with a thimble in a loop to the turnbuckle.

Measure all cables with the control stick and control surfaces in neutral. Tie the control stick in a neutral or center position with wire and hold the elevators in place with sticks clamped to them and to the stabilizer.

Run cables from the top shackle on the control stick to the bottom horns on the elevators. Arrange the length of the cables so that both elevators work together. All four cables run through the guide bridge under the fourth bottom cross strut.

Take care not to reverse the cables. The elevators must come up when the control stick is pulled back.

Rudder Cables:

MAKE the rudder cables (V–504) in the same way but measure the cables with the pedals tied to the pedal stop and the rudder turned to within ½" of the edge of the elevators.

Measure for the right cable with the rudder swung to the right and for the left cable with the rudder swung to the left. The cables are measured in this way so that at no time will the action of the rudder interfere with the action of the elevators.

Run the rudder cables between the two tie rods at the front of the pilot seat, in the spaces between bracing straps and the side struts.

Aileron Cables: (Item numbers here refer to January issue of POPULAR AVIATION)

ATTACH the ailerons to the wings and hook up the balance cable which you made in January. From the rest of the cable (V–55, group No. 4), run two lengths from the lower aileron horns to the pulleys on the front spars and down through the forward flying struts to the horn on the top of the torque shaft.

Solder a loop to each turnbuckle (V–38) and attach (V–39). None of these control cables should be under tension. They should be only tight enough to move the control surfaces without any great lag.

Care should be taken to see that the control stick is in the exact middle when both ailerons are in neutral. After the control cables are all correct, disconnect them.

Remove the tail group cables by unbolting the turnbuckles. Coil and carefully mark the cables (Viz., Top Right Elevators, etc.), and tie the coils to the inside of the fuselage near the pilot seat. Disconnect the aileron cables and the aileron balance cables at both ends and remove the ailerons.

Dismount the wings and lay them upon saw horses of a convenient height, to be covered. Pull the balance cable tightly in place in each wing panel and tie the ends to the spars to hold it in that position so that when the wing cover is stitched to the ribs the cable will not become entangled.

Wing Covering:

FOR each wing panel cut from V–120 two 9 foot 8" lengths of fabric and machine sew the pieces side by side with a ⅜" flat lap seam, using a double row of stitches. Cut also two lengths 7 feet 8" and one length ½ yard wide and 7 feet 8" long. Machine sew these pieces side by side as before.

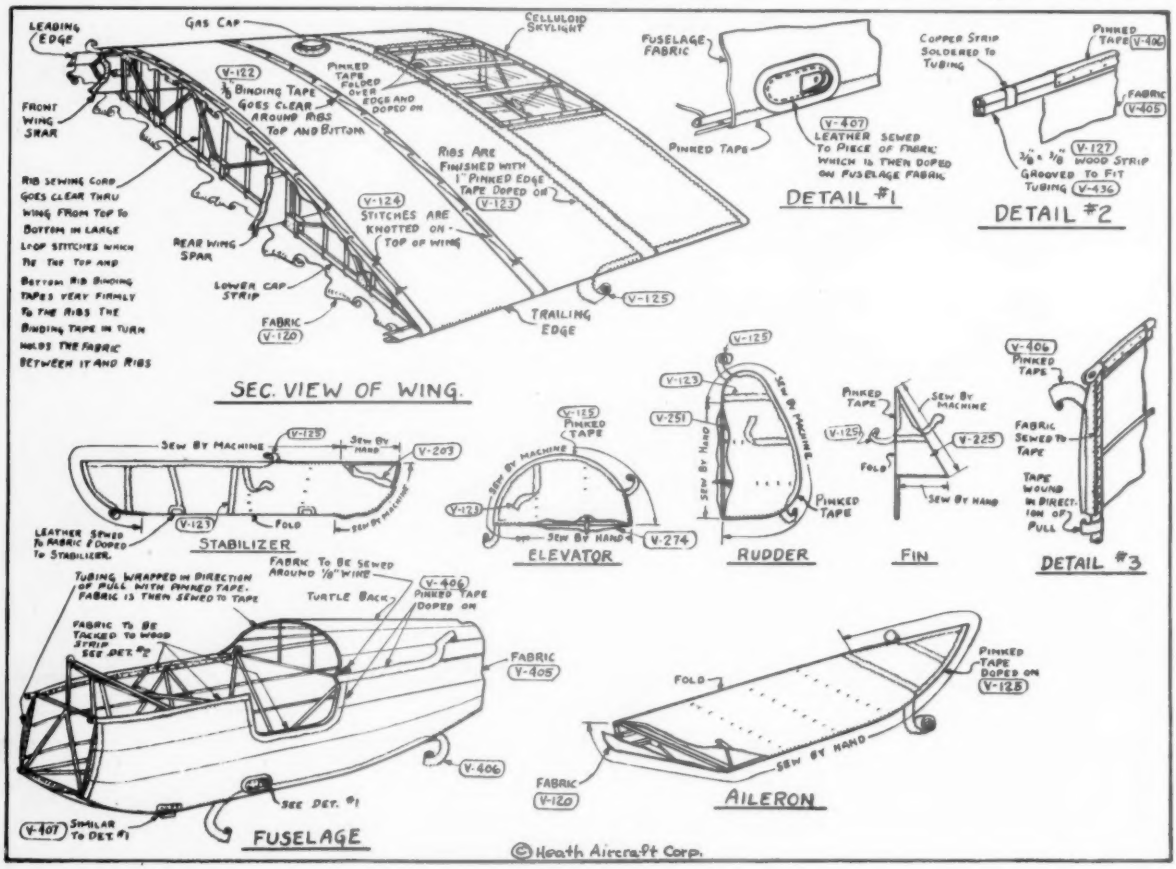
Now pin these two large pieces side by side so that the 9 foot 8" dimension of one piece extends one foot past either end of the 7 foot 8" dimension of the other piece. The seams should all run in the same direction. Machine sew the side together as before with a ⅜" flat lap seam and a double row of stitches.

Fold the cloth around the wing with the seams parallel to the ribs and the free ends at the trailing edge of the wing. Hold in position with pins. Straighten the cloth and allow 7" overhang at the butt end of the wing.

Draw the cloth fairly taut and pin at three inch intervals along the trailing edge and the lower edge of the rear spar at the aileron location. Put a few pins along the curved wing tip.

Return to the wing butt and pull the

The covering and covering details.



overhang from the under or flat surface of the wing around over the top or curved part of the butt rib and tack (V–58).

Then pull the cloth from the top side of the butt rib around to the bottom side and tack. In both cases start at the thickest part of the rib and work toward the edges to prevent wrinkling.

From the tip end stretch the cloth till the wrinkles are out, and the seams are straight or nearly straight. The second seam from the butt end should lie over the seventh rib.

Cut slits in the under side of the cloth while holding taut, for the flying strut fittings and aileron cable pulley and a small hole in the top for the aileron balance cable. Get as much stretch lengthwise as is possible.

Mark along the trailing edge and the wing tip a sewing line on both sides of the pinned fabric. Cut off the surplus cloth to within ½" of the lines. Unfasten five or six pins, fold the edges under for ½" past the sewing line, pin the folds and start sewing the edges together. Use the baseball stitch.

At the aileron gap the cloth is tacked to the spar instead of being sewed. Sew a small piece of fabric to the side of the small end of the seventh rib.

At each rib tack a strip of tape (V–122) to the top at a point directly over front spar and bring the tape around the trailing edge to front spar; tack as on top.

Then in large loop stitches (V–124) about 5" apart, tie the covering fabric and the tape to the ribs. Each stitch goes clear through the wing, encompassing the rib and each stitch is tied in a square knot.

Give the wing a coat of "dope" (V–121) and let it dry. Cut lengths of 1" pinked tape (V–123) to go around the wing from the trailing edge over the leading edge and back to the trailing edge. Stick with "dope" to the wing surface over the rib stitching. Run a strip of 1½" tape (V–125) along the leading edge and around the wing tip and trailing edges.

"Dope" a 4" round patch over the gas tank filler neck, and a 2½" round patch where the drain plug comes through the covering. Allow the wing to dry.

Do not be alarmed over the wrinkled appearance of the fabric. If the covering is free from wrinkles before the first coat of "dope" was applied, it will again be smooth after the third coat has dried. Allow one hour in warm, dry weather and six to eight hours between each coat in cold weather.

Do not attempt to apply "dope" on damp humid days. A warm, well ventilated room with no exposed flame in it makes a good place to work. "Dope" is highly inflammable and must not be exposed to flame.

By laying the various tail units upon the fabric specified in the *March* issue of POPULAR AVIATION, you can easily draw the outlines along which the cloth must be sewn. By examining the prints you will see that a good deal of this can be done by machine and a sort of envelope made to slip over the frames.

The cloth is rib stitched to these parts over binding tape (V–122) as on the wing and given one coat of "dope." When dry the stitches and the edges are bound with pinked tape "doped" on.

The leather patches which go on the stabilizer and on the wing top where the aileron balance cable emerges, will be attached next month. The ailerons are covered, rib stitched and bound in the same manner.

The use of bees wax on the sewing cord when sewing by hand prevents it from unravelling and sets the stitches.

The method of streamlining the wheels is shown in the landing gear print. The patches at the hubs and the valve opening are put on after the first coat of "dope" has dried. The third coat of "dope" can carry a pigment or aluminum powder.

Skylight:

CUT four panels of pyralin (V–170) to fit the openings left for them in your wings. Reinforce on one surface by cementing with "dope" pyralin strips ⅜" wide (V–171) across the pane. Reinforce on the opposite surface all four edges of each pane where the attaching screws (V–172) go, with ⅝" strips of pyralin cemented on with "dope." Let the reinforcing strips dry while clamped between boards. Attach with screws.

Make the rear one-third of the lower pane on the left wing where the aileron balance cable swivel snap is, independently removable. This is a hand hole cover. An extra strip of pyralin ⅝" wide is cemented to the larger of these two pieces so that it forms a flange beneath which the forward edge of the hand hole cover is placed.

In case you do not build a skylight this hand hole is cut into the cloth (6½"x10⅞") and a cover is made for it from plywood or scrap aluminum.

Your ship is now complete except for the cowling and fuselage covering which will be described next month.

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An Airy Chat

(*Continued from page 6*)

R. A. F., I shall be glad to exchange with them."

Now that's what I'd call a good opportunity for some of you readers.

* * *

MR. J. D. BENNETT of 7 Copeland Pl. wrote us a letter that requires an answer, but unfortunately he forgot to tell us what town he lived in so we're still waiting to answer his letter.

John Kubica of 1243 S. 58th Ave., Cicero, Ill., would like us to publish the addresses of model fans. He wants to correspond with Howard Peck and Catherine Confarotta and anybody else who wants to swap model dope with him.

* * *

HOMER R. HALE, of Kansas City, sent us these two pictures of his latest models. For exactness and completeness of detail these planes are about the best we've seen for a long time.

Unfortunately, Homer was too modest about his work and didn't give any details. But read his letter; then you'll know as much about it as we do:

"I am a collector of war plane pictures. This and making models of planes are my two pet hobbies. You will find enclosed photographs of my Nieuport 28 and S. E. 5.

Homer Hale's Nieuport 28 model—

"The 180 Spad will be my next model if I can secure accurate plans and more good pictures. I would like to see you print every good picture of war plane that you have, for I, as well as some of my friends, would appreciate them.

We hope you like the war plane pictures in this issue, Homer.

—and his model of the famous S. E. 5

ARNOLD INGALLS, down at New Haven, Conn., is so enthusiastic over P. A. that he nearly floored us with praise. Usually we're meek and modest over such letters, but in the face of this laudation we blushingly bow and receive applause.

"As for the main articles of the April issue, I must say that they are all decidedly singular. This holds not to this copy only, but to its forerunners. You publish a variety of subjects. I think they will be the things that will make your success a continuous performance.

"Your stories concerning flying during the war are a great attraction to myself and others that read them. I think that illustrations in any magazine are a wonderful help. Your drawings are O. K. and the photographs are perfect Godsends.

"The pictures of war planes that you publish are thoroughly helpful. One reads so many flying stories mentioning war planes that seeing them reproduced on paper gives the effect of visualization of the incidents carried on in the story.

"They are also a great help in comparison, showing vividly the huge strides taken since their reign in bullet-ridden air (or have there been such huge strides?).

"The brief topics thrown in between the large features excite the interest of any person. Accompanied with photos they constitute an added attraction.

"I feel that I should offer you my congratulations on your cover. It always makes me feel that the contents will be well worth spending twenty-five cents for.

"POPULAR AVIATION, as a whole, and to my way of thinking, has been, is and will always be (I hope) a terrific success."

* * *

SPEAKING of covers, that April cover of the Lincoln Playboy made a big hit. We have had letters from all over the United States and Canada —and even from Rio de Janiero and Shanghai—asking for more information on the plane.

There are a lot of new planes in this issue, so if you want more dope on any of them just write a letter to the manufacturer and send it on to us. We'll see that he gets it.

* * *

GEORGE HALSEY, of Texarkana, Ark., wrote us this letter. We *think* we're being razzed.

"As for my opinion of your magazine, it is fair. I have seen better ones. If the editor could get up a series of home study courses in aviation, there would be a marked improvement.

"Your write-ups on making models and the descriptions of them are in-

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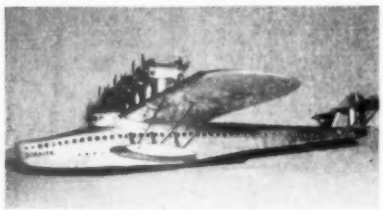
adequate. Some of the 'lucky birds' always get the free full-size plans, the supply of which, as you say, is limited, and the rest of us model builders are left out in the dark."

And that brings up the problem of the free model plans. Our models have been so popular that the requests for plans have been enormous. It keeps our model editor, Joe Ott, busy trying to keep one jump ahead of the demand.

So if your plans don't arrive by return mail, don't get excited—they will probably be along later.

* * *

THE other day Walter Dosien, a Chicago boy, came into our office and brought this photograph of a model Dornier DoX that he built. We



Walter Dosien's Model DoX

thought it was such a keen model that we decided to let you see it, too.

Walter tells us that its span is 4 ft., 5 in.; length, 3 ft., 7 in., and it weighs 16 lbs. It took 500 hours of work to finish it and Walter values it at $200.00. It was on exhibition at the Uptown Theater during the showing of "Hell's Angels."

One of the most interesting features of the model is the fact that the twelve propellers really work. They are driven by an electric motor in the hull, with belt drive through the hollow wing and motor mounts up to the propeller shafts.

* * *

IT SEEMS that art and aviation go hand in hand, because every month we get several drawings sent in to us.

This month Louis Jenkins of Chester, Pa., sent in a swell sketch of an imaginary pursuit job having all the features he would like to see embodied on a plane of that type.

And then Billy Metzger sent us two keen drawings in full color. One is a Lockheed Vega in flight and the other shows two planes chasing each other's tails far above the clouds.

Billy is the young fellow we told you about last month. He's been sick in bed for eight months and spends his time making model planes, drawing real planes and keeping up a correspondence with a lot of the big aviation officials who write to him regularly. We know that Bill would be glad to write to some of you fellows if you will address him at 1440 Clarence Ave., Lakewood, Ohio.

* * *

AMBROSE A. ASKEW, Jr., of Barrytown, N. Y., seems to be an enterprising young fellow and sends us this letter to show what he does with his spare time:

"I have just finished reading the April issue of POPULAR AVIATION, and as per usual am ready to cut out all the pictures for my aviation scrap books. I have five loose-leaf note books filled with pictures of planes from all over the world.

"Book one has 182 pictures; book two has 232 pictures. Both the first two books are American commercial planes only. Book three is of foreign planes only, with 159 pictures.

"Book four is of American fighting planes and foreign and American racing planes, and also radical planes of all the world. There are 153 pictures in it, and in book five there are plans for American and foreign planes—94 scale outline drawings."

* * *

MARION LASLEY of Goodland, Kans., has a $600 Curtiss Flying Service flying course that he would like to trade for a good air-cooled motor of 70 to 100 h.p., complete with prop.

Now, there's a bargain for somebody. And here's another "opportunity" letter. V. A. Kaemmer, 8630 98th St., Woodhaven, Long Island, N. Y., writes:

"I am a student at the Roosevelt Aviation School, Mineola, Long Island, and expect to qualify for my Limited Commercial Pilot's License within the next month. I am, therefore, anxious to line up with someone to do some commercial flying at the earliest possible moment. Possibly someone—it makes no difference to me where—has a plane but no commercial pilot's license, who might be open to taking me on as pilot on a barnstorming trip.

"In such event, I would also be glad to give the owner of such plane the benefits of my rather extensive course in flight training and ground school, or most any other sort of proposition that has to do with flying and which will bring me in some cash, will be acceptable. For the benefit of anyone who may be interested, I am 27 years of age and have had training in half a dozen different types of ships. I'll willingly fly a tin garage, provided it is equipped with wings."

With a straightforward proposition like that, we feel sure that V. A. will connect with the right party.

* * *

GOSH! here we are right at the end of the column all ready with just barely enough room left to express our thanks to all the other readers who have written us this month.

Your letters are the things that make this job interesting, so don't hesitate to write whenever you feel the urge.

—D. E. M.

Dear Mr. Frawley:
Want you to know
how much I enjoyed living
at the Park Central.
Nowhere else in America
or on the Continent have
I found such a residence.
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Aircraft Radio

***by Lieut. Myron F. Eddy,** U. S. Navy, Retired; formerly Instructor in Aircraft Radio, Naval Aviation Ground Schools; subsequently at Commercial Ground Schools.*
68 illustrations, $4.50

NOW READY—The only complete guide to the principles, selection, installation, operation, and maintenance, of aircraft radio. Tells how it is used in aerial navigation, with complete details about the apparatus, radio beacons, visual route indicators, etc.; how weather data and flight orders and reports are exchanged between airplanes and ground stations; how radio sets are installed in planes, and how the plane is electrically bonded and shielded to eliminate interference; how to service radio telegraph and radio telephone sets; with full details about the theory of radio; the circuits, mechanical details and functions of receiving and transmitting sets; etc.

Practical Flying

***by Major B. Q. Jones,** Air Corps, U. S. Army; formerly Chief of Army Aviation Training; pioneer in stunting, spinning, and fog flying.* **$3.00**

This famous pilot's manual can save you hours of time and a lot of money. It gives you that basic flying information that to learn otherwise requires long and costly experience. It contains a course of instruction that progresses right up to the license flight. Taxying, the take-off, the initial climb, emergency landings after the take-off, straightaway flight, turns, figures of eight, speed in glides and climbs, straight glides, gliding turns, landings, cross country flying, and stalls and spins are all thoroughly covered. Chapters on planes, instruments, plane parts, pilot's equipment, rules for testing the controls and the motor, etc., are included.

The Navigation of Aircraft

***by Lieut. Logan C. Ramsey,** Instructor in Aerial Navigation, Pensacola Naval Air Station; formerly Officer in Charge, Section of Aerial Navigation, Hydrographic Office, Navy Dept.* **$4.50**

A splendid work to tie up with "Aircraft Radio." It is a practical discussion of the common, work-a-day sort of aerial navigation every pilot must know. The book emphasizes dead reckoning, including plotting, course setting, and determining and correcting for wind effect. Piloting and navigation by aerial astronomy are also fully explained. This breadth of content provides a balanced discussion of aviation that is available in this book alone. In addition to covering fully the principles and practice of position finding by calculation and observation, the discussion includes maps, instruments, and accessories; compasses; etc.; etc.

Aeronautical Meteorology

***by Willis Ray Gregg,** Principal Meterologist; In Charge of Aerological Division, U. S. Weather Bureau. Assisted by eight meterological experts.*
126 illustrations, $4.50

Here is the most authoritative, complete and helpful book ever published on the air and its movements, and the weather, and on their effects on aircraft and on aerial transportation in general. It contains up-to-the-minute information on such vital topics as Fog, Ceiling and Visibility, Airship Meteorology, Ice Formation on Aircraft, the Weather Bureau Airway Service, etc. In addition, local forecasting, reading weather maps at a glance, pressure "lows" and "highs," and complete data on winds, storms, clouds, and the like, are included. It covers completely just what everybody connected with aviation ought to know about the atmosphere and weather.

Airplane Mechanics Rigging Handbook

***by R. S. Hartz,** formerly Lieut. Colonel, Air Corps, U. S. Army;* **and E. E. Hall,** *formerly Lieut., Air Corps, U. S. Army, and Editor, "Aircraft Servicing."* **$3.50**

Every plane that flies must be perfectly rigged. This is the book that tells how it should be done. It covers rigging, maintenance, inspection and repair, showing what you need to know to get an airplane into safe flying condition and how to keep it that way. Among the topics covered at length are: handling and dismantling an airplane; stresses and strains; sequence of rigging steps; truing up the fuselage, the center section, and the wings; adjusting the angles of incidence and dihedral; overall adjustments; spars and struts; splicing and fitting; controls and adjustments for instability; inspection; installing compasses; etc.; etc.

Simple Aerodynamics and the Airplane

***by Charles N. Monteith,** Chief Engineer, Boeing Airplane Co.; 3rd edition, revised by Colonel C. C. Carter, U. S. Military Academy, West Point.*
211 illustrations, $4.50

This is the famous book used by the cadets at West Point. It is known as the foundation manual of the industry to thousands of pilots, mechanics, flying and ground school students, and others. Its many illustrations and full explanations account for its wide use by individuals for home study. It makes everything perfectly clear about airplanes; flight; engine principles; design factors; characteristics and types of airfoils; parasite resistance; component types of an airplane; stability attainment; control surfaces; the propeller; airplane performance; dynamic loads; maneuverability and controllability; structural considerations; etc.

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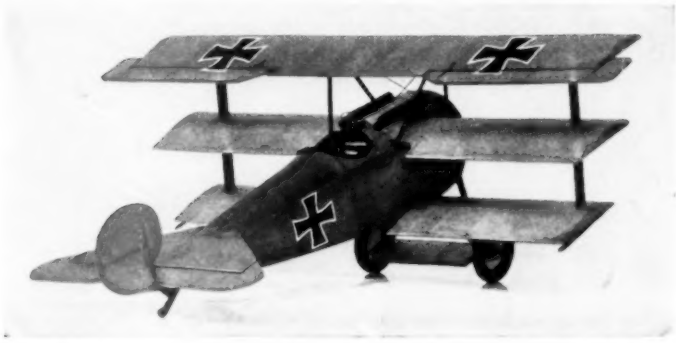

An absolutely authentic model of the plane most feared by Allied pilots—feared, for at its controls sat Germany's most audacious airman—the idol of his nation. This Cleveland-Designed ¾-inch scale brilliant all-red Triplane with its 17¾-inch span, 14⅛-inch length, and 6⅞-inch height, is colored just like its famous prototype with a few black details which deftly set it off. It has double spandau guns, movable ailerons, a complicated fuselage design which we have simplified (even a beginner can make it), all the cut "Blue Diamond" balsa wood, rubber, paper, colored dopes, cements, etc.—to say nothing of the full-size, completely detailed drawings and instructions. Order Kit CB-6; only $4. postfree. (Foreign orders, 25c extra).

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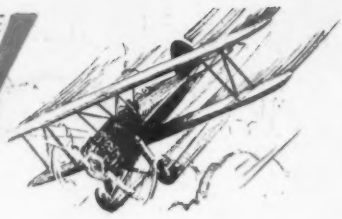

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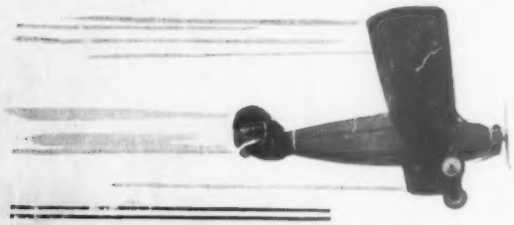

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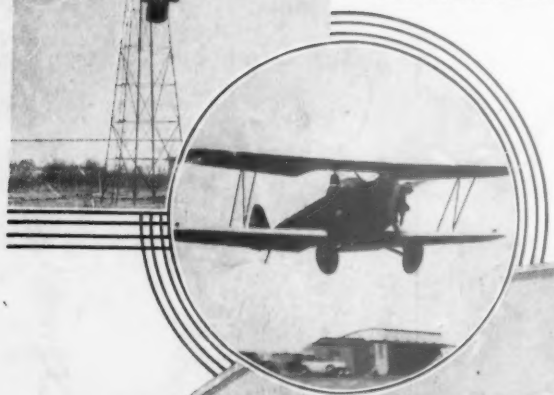

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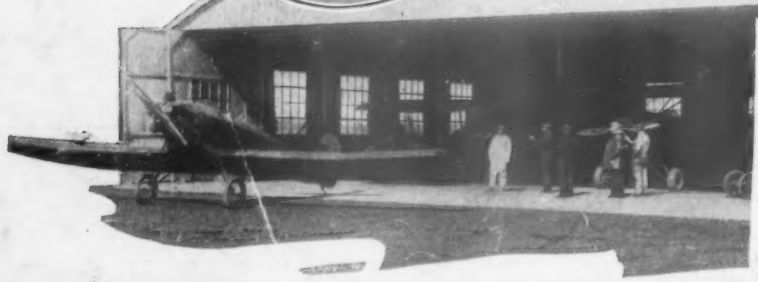

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